PHILIPS 28PW6005

MODEL

SERVICE MANUAL CHASSIS A10E AA

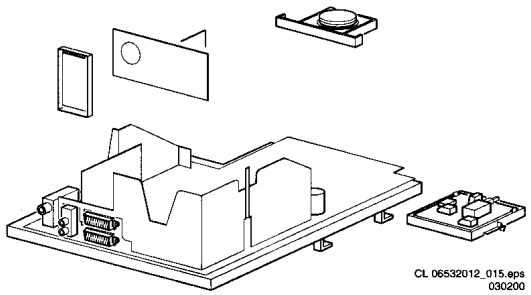
Colour Television

Chassis

A10E

AA

Service
Service
Service



CL 06532012_015.eps
030200

Service Manual

Contents		Page	
1. Technical Specifications		2	
2. Safety- and maintenance instructions, warnings and notes.		4	
3. Directions for use		6	
4. Mechanical instructions		13	
5. Faultfinding and repair tips		15	
6. *Faultfinding trees*			
Supply voltage diagram		23	
Blockdiagram		24-25	
Testpointsoverview		26	
Wiring diagram		27	
7. *Electrical diagram's en PWB's*		*Diagram*	*PWB*
Power supply	(Diagram A1)	28	35-37
Horizontal deflection	(Diagram A2)	29	35-37
Vertical deflection	(Diagram A3)	30	35-37
SSP Tuner	(Diagram A4)	31	35-37
SSP SCART	(Diagram A5)	32	35-37
Audio	(Diagram A6)	33	35-37
Front control/Rotation/Headphone	(Diagram A7)	34	35-37
CRT panel	(Diagram B)	38	39
IF & Sync.	(Diagram C1)	40	47-48
Video processing	(Diagram C2)	41	47-48
Video features	(Diagram C3)	42	47-48
Diversity tables (SSB)		43	
Micro controller	(Diagram C4)	44	47-48
Memory	(Diagram C5)	46	47-48
Audio processing (1)	(Diagram C6)	45	47-48
Audio processing (2)	(Diagram C7)	46	47-48
SSB connector	(Diagram C8)	47	47-48
Side I/O panel	(Diagram D)	49	50
Top control panel	(Diagram E)	51	51
Front interface panel	(Diagram J)	52	52

Contents	Page
8. Alignments	53
9. Circuit description and list of abbreviations	58 68
10. Spareparts list	70

©Copyright reserved 2000 Philips Consumer Electronics B.V. Eindhoven, The Netherlands. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.

Published by JvR 0062 Service PaCE | Printed in the Netherlands | Subject to modification | GB 3122 785 10430

PHILIPS

1. Technical specification, connection facilities and chassis overview

1.1 Supply

Mains Voltage	:	230 Vac ± 15 %
Power Consumption	:	160 W max.
Stand By cosumption (220V)	:	≤ 3 W
Mains Frequency	:	50 - 60 Hz (5 %
Tuning System	:	PLL
Reception	:	Western Europe - PAL B/G/D/K/I, SECAM B/G/D/K/L/L'
	:	Eastern Europe - PAL B/G/D/K, SECAM B/G/D/K
Sound System	:	Western Europe - 2CS BG, NICAM I/B/G/D/K/L,
	:	Eastern Europe - 2CS, NICAM B/G/D/K
Sound Output	:	2 x 5 W - 24" and 28"
	:	2 x 10 W - 32"
Ambient temperature :	:	+ 5 oC to +45 °C
Frequency ranges - tuner	:	Off air - 45.25 - 855.25 MHz
	:	Cable - 69.25 - 463.25 MHz
Aerial input	:	Coaxial 75 Ω
Synchronization	:	Horizontal Pull-In range (+200-300Hz)
	:	Vertical pull-in Range (± 5 Hz)
Teletext	:	10 / 100 pages
Remote Control	:	Type - RCA10E82B

1.2 Connection Diagram

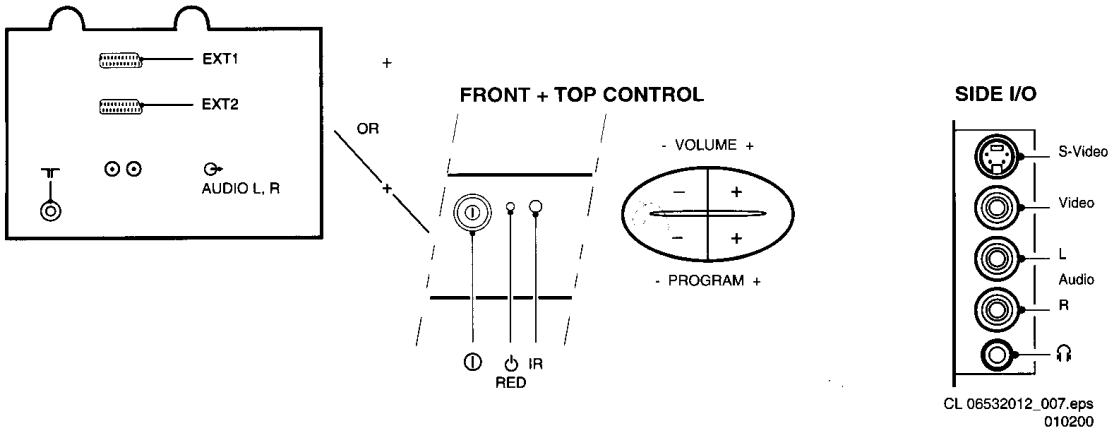


Figure 1-1

1.2.1 EXT1: CVBS (in/out) + RGB (in) - Tuner at output

1 - Audio R	(0.5 V_{RMS} / 1 kΩ)	⊖→
2 - Audio R	(0.2 - 2 V_{RMS} / 10 kΩ)	⊖
3 - Audio L	(0.5 V_{RMS} / 1kΩ)	⊖→
4 - Audio	GND	⏚
5 - Blue	GND	⏚
6 - Audio L	(0.2 - 2 V_{RMS} / 10kΩ)	⊖
7 - Blue	(0.7 V_{PP} / 75 Ω)	⊖
8 - CVBS status	(0-2V: INT; 4.5-7V: EXT1-16/9; 9.5-12V:EXT1-4/3)	
9 - Green	GND	⏚
10-		
11- Green	(0.7 V_{PP} / 75 Ω)	⊖
12-		
13- Red	GND	⏚
14- RGB status	GND	⏚
15- Red	(0.7 V_{PP} / 75Ω)	⊖
16- RGB status	(0-0.4V: INT;1-3V: EXT1/75Ω)	
17- CVBS	GND	⏚
18- CVBS	GND	⏚
19- CVBS	(1 V_{PP}/75Ω)	⊖→
20- CVBS	(1 V_{PP}/75Ω)	⊖
21- Earth screen	GND	⏚

1.2.2 EXT2: CVBS (in/out) + SVHS (in)

Input: EXT2 then output = tuner; input: other then output = input

1 - Audio R	(0.5 V_{RMS} / 1kΩ)	⊖→
2 - Audio R	(0.2 - 2 V_{RMS} / 10kΩ)	⊖
3 - Audio L	(0.5 V_{RMS} / 1kΩ)	⊖→
4 - Audio	GND	⏚
5 -		
6 - Audio L	(0.2 - 2 V_{RMS} / 10kΩ)	⊖
7 -		
8 - CVBS status	(0 - 2 V: INT, 4.5 - 7 V: EXT1 16:9, 9.5 - 12 V: EXT1 4:3)	
9 -		
10-		
11-		
12-		
13- C	GND	⏚
14-		
15- C	(300 mV_{PP} / 75 Ω)	⊖
16-		
17- CVBS	GND	⏚
18- CVBS	GND	⏚
19- CVBS	(1 V_{PP} / 75 Ω)	⊖→
20- CVBS/Y	(1 V_{PP} / 75 Ω)	⊖
21- Earth screen	GND	⏚

1.2.3 Cinch - audio out

L	- Audio (red)	(0.5 V_{RMS} / 1 kΩ)
R	- Audio (white)	(0.5 V_{RMS} / 1 kΩ)

1.2.4 Cinch - audio/video in

-	- CVBS (yellow)	(1 V)
L	- Audio (red)	(0.2 - 2 V_{RMS} / 10 kΩ)
R	- Audio (white)	(0.2 - 2 V_{RMS} / 10 kΩ)

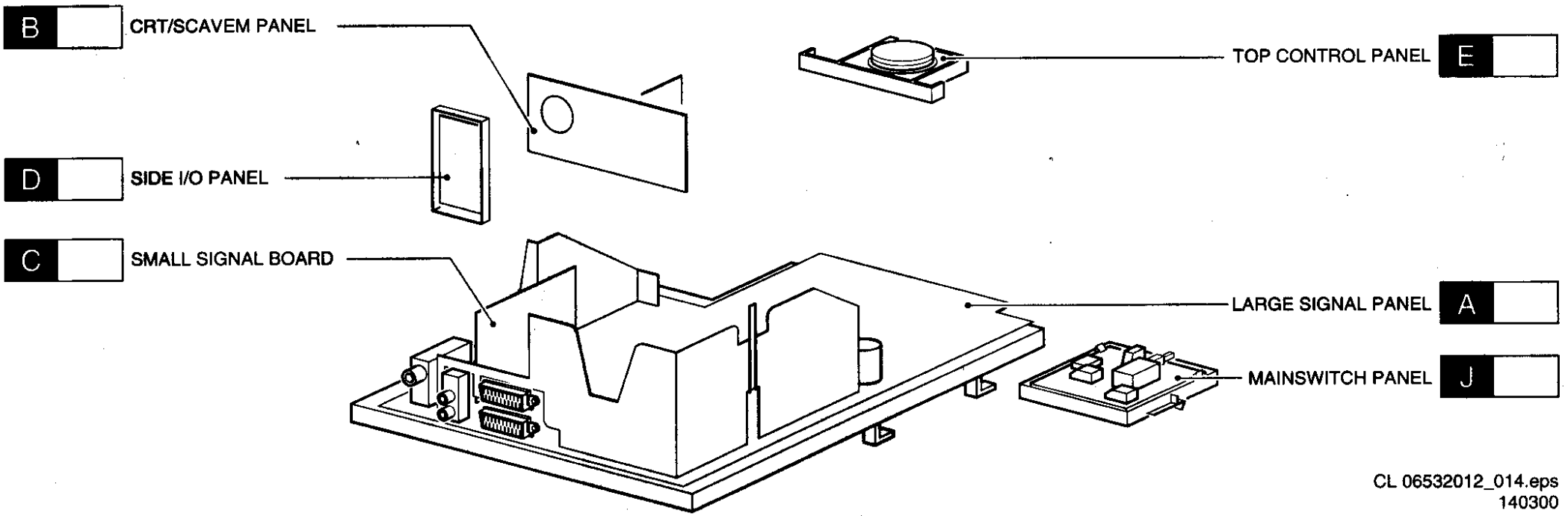
1.2.5 Headphone

-	- Jack	32 - 2000 Ω.(10 mW)

1.2.6 SVHS

1	-	
2	-	
3	- Y	(1 V_{PP} / 75 Ω)
4	- C	(0.3 V_{PP} / 75 Ω)

1.3 PCB location drawing



CL 06532012_014.eps
140300

2. Safety instructions, maintenance instruction, warnings and Notes

2.1 Safety instructions for repairs ⚠

1. Safety regulations require that during a repair:
   - The set should be connected to the mains via an isolating transformer;
   - Safety components, indicated by the symbol ⚠, should be replaced by components identical to the original ones;
   - When replacing the CRT, safety goggles must be worn.
2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.
   - As a strict precaution, we advise you to resolder the solder joints through which the horizontal deflection current is flowing, in particular ('general repair instruction'):
     - All pins of the line output transformer (LOT);
     - Fly-back capacitor(s);
     - S-correction capacitor(s);
     - Line output transistor;
     - Pins of the connector with wires to the deflection coil;
     - Other components through which the deflection current flows.
     - Note:
     - This resoldering is advised to prevent bad connections due to metal fatigue in solder joints and is therefore only necessary for television sets older than 2 years.
   - The wire trees and EHT cable should be routed correctly and fixed with the mounted cable clamps.
   - The insulation of the mains lead should be checked for external damage.
   - The mains lead strain relief should be checked for its function in order to avoid touching the CRT, hot components or heat sinks.
   - The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets which have a mains isolated power supply). This check can be done as follows:
     - Unplug the mains cord and connect a wire between the two pins of the mains plug;
     - Set the mains switch to the "on" position (keep the mains cord unplugged!);
     - Measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ
     - Switch off the TV and remove the wire between the two pins of the mains plug.
   - The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

2.2 Maintenance instruction

It is recommended to have a maintenance inspection carried out by a qualified service employee. The interval depends on the usage conditions:

- When the set is used under normal circumstances, for example in a living room, the recommended interval is 3 to 5 years.
- When the set is used in circumstances with higher dust, grease or moisture levels, for example in a kitchen, the recommended interval is 1 year.
- The maintenance inspection contains the following actions:
  - Execute the above mentioned 'general repair instruction'.
  - Clean the power supply and deflection circuitry on the chassis.
  - Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

1. ESD
2. All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
3. Available ESD protection equipment:
   - Complete kit ESD3 (small table mat, Wristband, Connection box, Extension cable and Earth cable) 4822 310 10671
   - Wristband tester 4822 344 13999
4. In order to prevent damage to ICs and transistors, all high-voltage flashovers must be avoided. In order to prevent damage to the picture tube, the method shown in Fig. 2.1 should be used to discharge the picture tube. Use a high-voltage probe and a multimeter (position DC-V). Discharge until the meter reading is 0V (after approx. 30s).
5. Together with the deflection unit and any multipole unit, the flat square picture tubes used form an integrated unit. The deflection and the multipole units are set optimally at the factory. Adjustment of this unit during repair is therefore not recommended.
6. Be careful during measurements in the high-voltage section and on the picture tube.
7. Never replace modules or other components while the unit is switched on.
8. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.
9. Wear safety goggles during replacement of the picture tube.

2.4 Notes

The direct voltages and oscillograms should be measured with regard to the tuner earth (⏚), or hot earth (⏚) as this is called. The direct voltages and oscillograms shown in the diagrams are indicative and should be measured in the Service Default Mode (see chapter 8) with a colour bar signal and stereo sound (L:3 kHz, R:1 kHz unless stated otherwise) and picture carrier at 475.25 MHz.
Where necessary, the oscillograms and direct voltages are measured with (⊓) and without aerial signal (⋊). Voltages in the power supply section are measured both for normal operation (⏻) and in standby (⏻). These values are indicated by means of the appropriate symbols.
The picture tube PWB has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
The semiconductors indicated in the circuit diagram and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

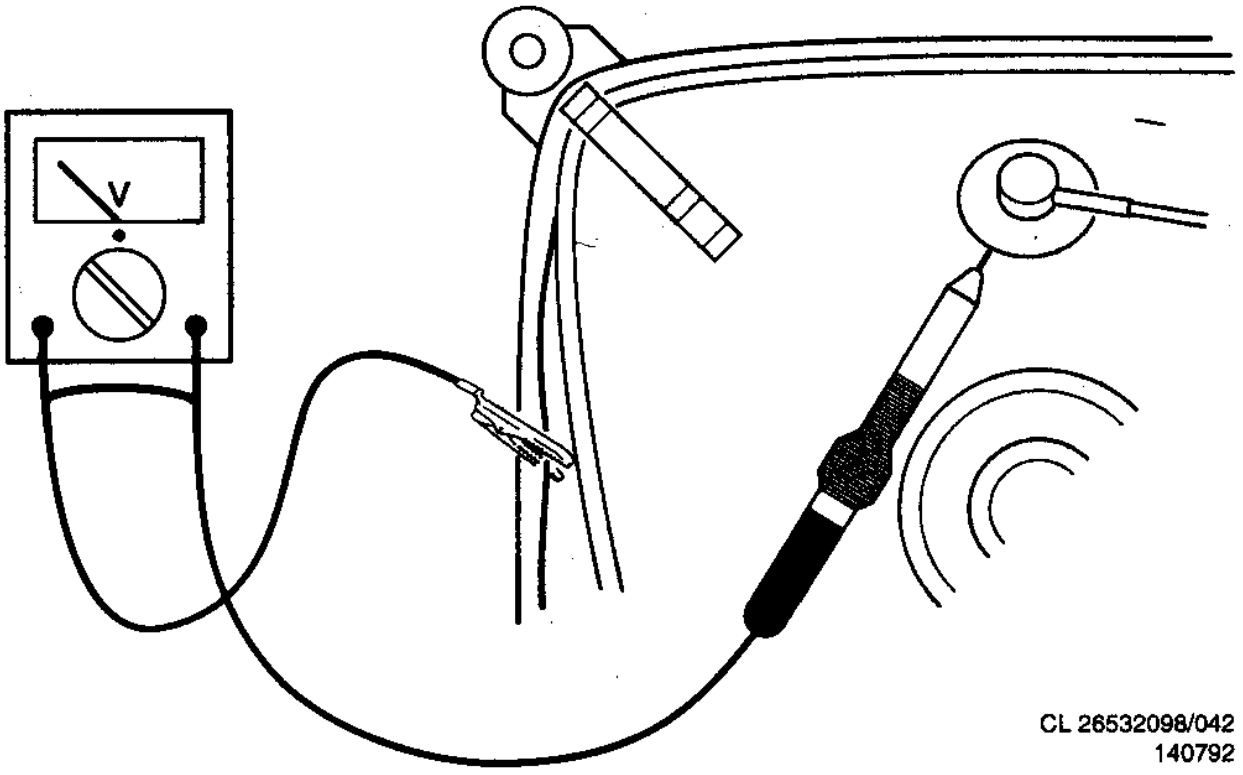


Figure 2-1

3. Directions for use

Introduction

Thank you for purchasing this television set.
This handbook has been designed to help you install and operate your TV set.
We would strongly recommend that you read it thoroughly.
We hope our technology meets entirely with your satisfaction.

Table of Contents

Installation
Installing your television set 2
The keys on the TV set 2
The remote control keys 3
Quick installation 4
Sorting programmes 4
Using other menus 5
Choosing a language and country 5
Automatic tuning 5
Manual tuning 6
Programme name 6

Operation
Adjusting the picture 7
Adjusting the sound 7
Rotating the picture 7
Timer function 8
Locking the set 8
Teletext 9
16:9 Formats 10

Peripherals
Video recorder 12
Other equipment 12
To select connected equipment 12
Connecting other appliances 13
TV / VCR / DVD mode selector 13

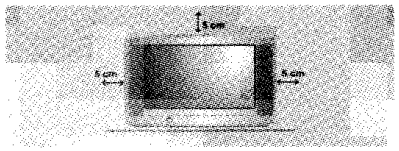
Practical information
Tips 14
Glossary 14

Recycling
The materials used in your set are either reusable or can be recycled.
To minimise environmental waste, specialist companies collect used appliances and dismantle them after retrieving any materials that can be used again (ask your dealer for further details).

Installing your television set

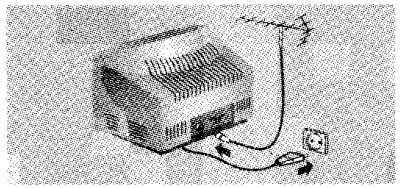
❶ Positioning the television set

Place your TV on a solid, stable surface, leaving a space of at least 5 cm around the appliance.
To avoid accidents, do not put anything on the set such as a cloth or cover, a container full of liquid (vase) or a heat source (lamp). The set must not be exposed to water.



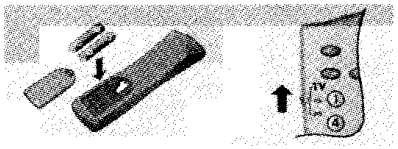
❷ Connections

- Insert the aerial plug into the ⊓⊓ socket at the rear of the set.
- Insert the mains plug into a wall socket (220-240 V / 50 Hz).



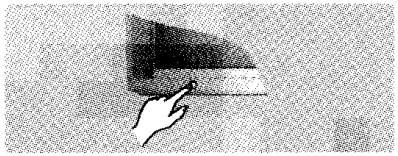
❸ Remote control

Insert the two R6-type batteries (supplied) making sure that they are the right way round.
Check that the mode selector is set to TV.
The batteries supplied with this appliance do not contain mercury or nickel cadmium. If you have access to a recycling facility, please do not discard your used batteries (if in doubt, consult your dealer). When the batteries are replaced, use the same type.



❹ Switching on

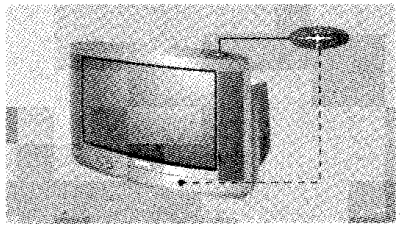
To switch on the set, press the on/off key.
A red indicator comes on and the screen lights up. Go straight to the chapter Quick installation on page 4.



If the television remains in standby mode, press P ⊕ on the remote control.
The indicator will flashe when you use the remote control.

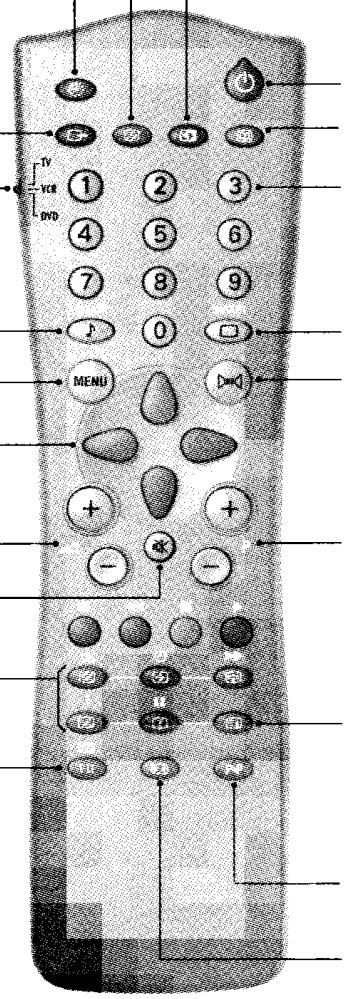
The keys on the TV set

The television set has 4 keys which are located on the front or the top of the set depending on the model.



The VOLUME - + (- ◿ +) keys are used to adjust sound levels.
The PROGRAM - + (- P +) keys are used to select the required programmes.
To access the menus, simultaneously hold down the ◿ - and ◿ + keys. The PROGRAM - + keys may then be used to select an adjustment and the - ◿ + keys to make that adjustment.
To exit from the menus, hold down the 2 ◿ - and ◿ + keys.
Note: when the CHILD LOCK function is activated, these keys are unavailable (refer to FEATURES menu on page 8).

The remote control keys



key not used

Sleeptimer
To select the length of time before the set automatically switches to standby (from 0 to 240 minutes)

Select EXT sockets
Press several times to select EXT1, EXT2 and on certain models EXT3 and S-VHS2.

Mode selector (p. 13)
To activate the remote control in TV,VCR (video recorder) or DVD mode.

Smart sound controls
To access a series of settings: VOICE, MUSIC, THEATRE and return to PERSONAL

Menu
To display or exit from the menus

Cursor
These 4 keys are used to move within the menus or to have direct access to the 16:9 formats (p 10).

Volume
To adjust the sound level

Mute
To disable or enable the sound.

Teletext features (p. 9)

Sound mode
To switch from STEREO to MONO or to choose between Dual I and Dual II for bilingual transmissions.
For TV sets fitted with NICAM reception, depending on the transmission, you can switch from NICAM STEREO to MONO or choose between NICAM DUAL I, NICAM DUAL II and MONO.
When the sound mode is switched to MONO, the indication is displayed in red.

Contrast +
To activate / de-activate the automatic contrast adjustment system (the dark areas are made darker whilst maintaining the detail).

Standby
To set the TV to standby mode.
To switch the TV set on again, press P ⊖ ⊕ or 0 9.

key not used

Numerical keys
For direct access to programmes. For a 2 digit programme number, the 2nd digit must be entered before the dash disappears.

Smart picture controls
To access a series of settings: RICH, NATURAL, SOFT, MULTIMEDIA and return to PERSONAL.

Incredible Surround
To activate / deactivate the surround sound effect. In stereo, this gives the impression that the speakers are further apart. In mono, a stereo spatial effect is simulated.

Selecting TV programmes
To move up or down a programme. The number, (the name) and the sound mode are displayed for a few seconds.
For some programmes equipped with teletext, the title of the programme appears at the bottom of the screen.

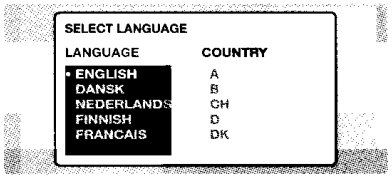
Screen information
To display / remove the programme number, the name (if it exists), the time, the sound mode and the time remaining on the timer. Hold down for 5 seconds to permanently display the programme number on the screen

Previous programme
To access the previously viewed programme.

16:9 formats (p. 10)

Quick installation

The first time you switch on the television, a menu appears on the screen.
This menu asks you to choose the language of the menus :

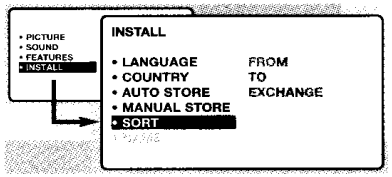


If the menu does not appear, hold down the ◿ - and ◿ + keys on the set for 5 seconds to bring it up.

1. Use the ◯◯ keys on the remote control to choose your language then confirm with ⊂⊃.
2. Then select your country using the ◯◯ keys and confirm with ⊂⊃.
If your country does not appear in the list, select "..."
3. Tuning starts automatically.
The operation takes several minutes.
A display shows the search status and the number of programmes found. When it has finished the menu disappears.
To exit or interrupt the search, press the MENU key.
If no programmes are found, refer to the chapter entitled Tips on p. 14.
4. If the transmitter or the cable network broadcasts the automatic sort signal, the programmes will be correctly numbered.
5. If not, the programmes found will be numbered in descending order starting at 99, 98, 97, etc. (or 79, 78, ...).
Use the SORT menu to renumber them.
Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). Where this is the case, make your choice using the ◯◯ keys and confirm with ⊂⊃.

Sorting programmes

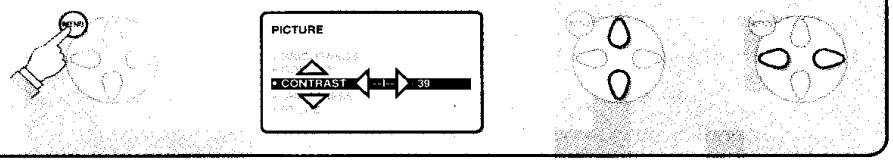
1. Press the MENU key. The main menu is displayed.
2. Select INSTALL (◯), then press ⊂⊃.
The INSTALL menu appears.



3. Using the ◯ key, select SORT then press ⊂⊃.
The SORT menu appears. The FROM option is activated.
Note: this menu works as follows:
- *Change "FROM" (enter the current programme number),*
- *"TO" (enter the new number),*
- *EXCHANGE numbers" (the operation is carried out).*

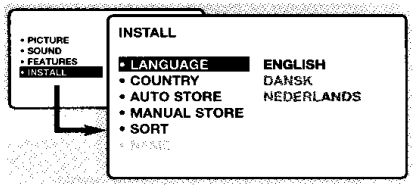
4. Select the programme you wish to renumber using ⊂⊃ keys or 0 to 9.
Example: to renumber programme 78 as 2 press 7 8.
5. Select TO (using ◯ key) and enter the new number with ⊂⊃ keys or 0 to 9 (for the example given, enter 2).
6. Select EXCHANGE (◯ key) and press ⊂⊃.
The message EXCHANGED appears, the exchange takes place. In our example, programme 78 is renumbered as 2 (and programme 2 as 78).
7. Select the option FROM (◯ key) and repeat stages 4 to 6 as many times as there are programmes to renumber.
8. To exit from the menus, press EXIT.

Using other menus



Choosing a language and country

1. Press the MENU key to display the main menu.
2. Select INSTALL (▽), then press ▷.
   The INSTALL menu appears.
   The LANGUAGE option is activated.

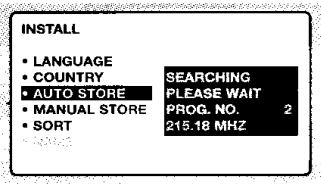


3. Press ▷ to go into the LANGUAGE menu.
4. Select your language with the △▽ keys.
   The menus will appear in the chosen language.
5. Press ◁ to exit the LANGUAGE menu.
6. Select the option COUNTRY and press ▷.
7. Select your country with △▽ keys (GB).
   If your country does not appear in the list, select "..."
8. Press ◁ to exit the COUNTRY menu.
9. To exit from the menus, press EXIT.

Automatic tuning

This menu allows you to automatically search for all the programmes available in your region (or on your cable network).

1. First carry out operations 1 to 8 above, then:
2. Press ▽ once to select AUTO STORE then press ▷. The search begins.
   After several minutes, the INSTALL menu reappears automatically.



3. If the transmitter or the cable network broadcasts the automatic sort signal, the programmes will be correctly numbered.
4. If not, the programmes found will be numbered in descending order starting at 99, 98, 97, etc. (or 79, 78, ...).
   Use the SORT menu to renumber them.
   Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). Where this is the case, make your choice using the △▽ keys and confirm with ▷.
   To exit or interrupt the search, press the MENU key. If no picture is found, refer to the chapter entitled Tips on p. 14.
5. To exit from the menus, press EXIT.

Manual tuning

This menu allows you to store the programmes one by one.

1. Press MENU.
2. Select INSTALL (▽), then press ▷.
   The INSTALL menu appears.
3. Select MANUAL STORE (▽) then press ▷.
   The menu appears :

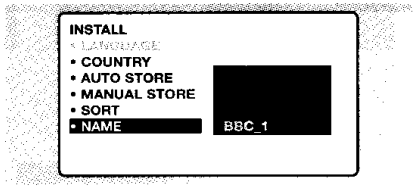
4. Press ▷ to go to the SYSTEM menu.
   Use △▽ to choose EUROPE (automatic detection*) or manual detection with WEST EUR (standard BG reception), EAST EUR (standard DK reception), UK (standard I reception) or FRANCE (standard LL').
   Then press ◁ to exit from the menu.
   ** Except for France (standard LL'): select the option FRANCE.*
5. Select SEARCH and press ▷.
   The search begins. As soon as a programme is found, the search will stop. If you know the frequency of the programme required, enter its number directly using the 0 9 keys and go to step 7.
   If no programme is found, refer to the Tips chapter on page 14).
6. If reception is un-satisfactory, select FINE TUNE and hold down ◁ or ▷ key.
7. Select PROG. NO (programme number) and use the ◁ ▷ or 0 to 9 keys to enter the desired number.
8. Select STORE and press ▷. The message STORED appears. The programme is stored.
9. Repeat steps 5 to 8 for each programme to be stored.

To exit: press the EXIT key.

Programme name

You may, if you wish, give a name to the first 40 programmes (from 1 to 40).

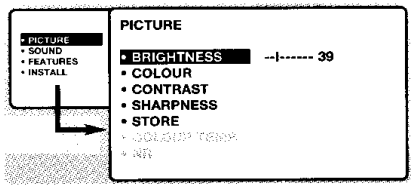
1. Press MENU.
2. Select INSTALL (▽), then press ▷.
   The INSTALL menu appears.
3. Press ▽ 5 times to select NAME (concealed at the bottom of the screen), then press ▷.
   The menu appears :



4. Select the programme you wish to name using the keys 0 9 or − P +.
   Note: at the time of installation, the programmes are automatically named when the identification signal is transmitted.
5. Use the keys ◁▷ to move within the name display area (5 characters).
6. Use keys △▽ to choose the characters.
7. Press MENU when the name has been entered.
   The programme name is stored.
8. Repeat steps 4 to 7 for each programme to be named.
9. To exit from the menus, press EXIT.

Adjusting the picture

❶ Press MENU then ▷.
The PICTURE menu appears :

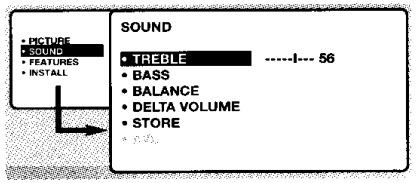


❷ Use △▽ keys to select a setting and ◁▷ keys to adjust.
Note: the menu is a scroll-down menu. Keep the key ▽ held down to access the settings hidden at the bottom of the screen.
❸ Once the necessary adjustments have been made, select the option STORE and press ▷ to store them.
❹ To exit from the menus, press EXIT.

Description of the settings:
- BRIGHTNESS: alters the brightness of the image.
- COLOUR: alters the colour intensity.
- CONTRAST: alters the variation between light and dark tones.
- SHARPNESS: alters the crispness of the image.
- STORE: stores the picture settings.
- COLOUR TEMP (colour temperature): adjusts the colour temperature of the picture. Three options are available here: COOL (blue white), NORMAL (balanced) or WARM (red white).
- NR (Noise Reduction): alleviates fuzziness (snowy picture). This setting is useful when reception is difficult.

Adjusting the sound

❶ Press MENU, select the SOUND option (▽) and press ▷. The SOUND menu appears :



❷ Use △▽ keys to select a setting and keys ◁▷ to adjust.
Note: to access the AVL setting (hidden at the bottom of the screen) hold down ▽ key.
❸ Once the necessary adjustments have been made, select the option STORE and press ▷ to store them.
❹ To exit from the menus, press EXIT.

Description of the settings:
- TREBLE: alters the levelof the high frequency sound.
- BASS: alters the levelof the low frequency sound.
- BALANCE: to balance the sound between the left and right speakers.
- DELTA VOLUME (volume difference): allows you to compensate for the volume differences between the different programmes or the EXT sockets. This setting is available for programmes 1 - 40 and the EXT sockets.
- STORE: stores the sound settings.
- AVL (Automatic Volume Leveller): automatic volume control used to avoid sudden increases in volume, particularly when changing programmes or during advertisements

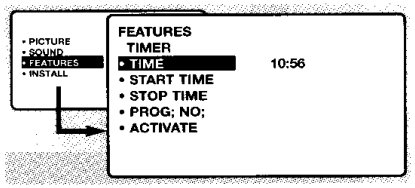
Rotating the picture

(only available on certain versions)

Larger screens are sensitive to variations in the earth's magnetic field. This setting makes it possible to compensate for this phenomenon.
❶ Press MENU.
❷ Select FEATURES (▽) and press ▷.
The FEATURES menu appears.
❸ Use ▽ key to select ROTATION and use ◁▷ keys to alter the angle of the image.
❹ Press EXIT to exit from the menus.

Timer function

This menu allows you to use your TV as an alarm clock.
❶ Press MENU.
❷ Select FEATURES (▽) and press ▷ twice.
The TIMER menu appears :



❸ Press ▷ to enter and exit the sub-menus and use keys △▽ or 0 9 to adjust:
❹ TIME: enter current time.
Note: the time is updated automatically each time the set is switched on using teletext information taken from programme 1. If programme 1 does not have teletext, the update will not take place.
❺ START TIME: enter the start time.
❻ STOP TIME: enter the stop time.
❼ PROG; NO;: enter the number of the programme required.
❽ ACTIVATE: you can set the alarm to be activated:
- ONCE ONLY for a one-off alarm,
- DAILY for a daily alarm or
- STOP to cancel.

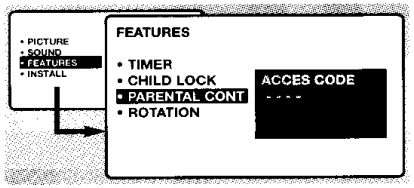
❾ Press EXIT to set the TV to standby. It will automatically switch on at the time programmed. If you leave the TV switched on, it will only change programme at the time indicated.
The combination of the CHILD LOCK and TIMER functions may be used to limit the length of time your television is in use, for example, by your children.

Locking the set

You can bar access to certain programmes or completely lock the set by locking the keys.

Locking programmes

❶ Press MENU.
❷ Select FEATURES (▽) and press ▷.
❸ Select PARENTAL. CONT. (▽) and press ▷.



❹ Enter your confidential access code. The first time, enter the code 0711 then confirm by re-entering 0711. The menu appears.
❺ Press ▷ to go into the menu.
❻ Use keys △▽ to select the required programme and confirm with ▷. The symbol 🔒 is displayed alongside the programmes or sockets that have been locked.
❼ Press EXIT to exit.
To watch a programme which has been locked you will now need to enter the confidential code; otherwise the screen will remain blank.
Caution: in the case of encrypted programmes which use an external decoder, it is necessary to lock the corresponding EXT socket.

To unlock all programmes
Repeat stages ❶ to ❹ above, then select CLEAR ALL and press ▷.

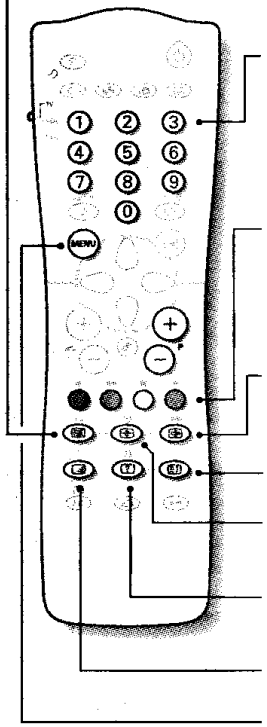
To change the confidential code
Repeat stages ❶ to ❹ above, then:
❺ Select CHANGE CODE and enter your own 4-digit number.
❻ Confirm by entering it again.
Your new code will be stored.
❼ Press EXIT to exit from the menus.

Locking the keys

❶ Press MENU, select FEATURES (▽) and press ▷.
❷ Select CHILD LOCK (▽) and press ▷.
❸ Enter your confidential access code.
❹ Press ▷ to set the lock to ON.
❺ Switch off the set and put the remote control out of sight.
The set cannot be used (it can only be switched on using the remote control).
❻ To cancel: switch CHILD LOCK to OFF.

Teletext

Teletext is an information system, broadcast by certain channels, which can be read like a newspaper. It also provides subtitles for people with hearing difficulties or those who are unfamiliar with the language in which a particular programme is being broadcast (cable networks, satellite channels, etc.).



Switch teletext on/off
To call up or exit from teletext. At first, the main index page appears with a list of the items available. Each page has a corresponding 3-figure number.
If the selected channel does not broadcast teletext, 100 will appear and the screen will remain blank (in this case, exit from teletext and choose another channel).

Selecting a teletext page
Use keys 0 to 9 or − P + to enter the page number required.
For example: for page 120, press 1 2 0.
The number is displayed in the top left-hand corner, the page counter starts searching and the page is displayed. Repeat the procedure to consult another page.
If the counter continues searching, this means that the selected page is not broadcast. Choose another number.

Direct access to subject headings
Coloured zones are displayed at the bottom of the screen. The 4 coloured keys give access to the corresponding subjects or pages.
The coloured zones flash when the subject or the page is not yet available.

Stop the sequence of sub-pages
Some pages contain sub-pages which follow on automatically from one another. This key allows sub-page sequence to be enabled or disabled. The sign appears in the top left hand corner.

Table of contents
To return to the table of contents (normally page 100).

Page enlargement
Press this key to display the upper, then lower part of the screen, and then to return to the normal page size.

Reveal
Use this key to reveal/conceal hidden information (answers to puzzles).

Overlaying text on the TV picture
To activate or deactivate screen overlay.

Favourite pages
(available only on certain models)
For teletext programmes 1 to 40, you can store 4 favourite pages which you can then access via the coloured keys.

1. Press MENU.
2. Enter the number of the page required.
3. Press then the coloured key of your choice. The page is stored.
4. Repeat steps 2 and 3 for the other coloured keys.
5. From now on, when you consult teletext, your favourite pages appear in colour at the bottom of the screen.
   To get back to the normal subject headings, press MENU.

To remove these settings, hold down for 5 seconds.

16:9 Formats

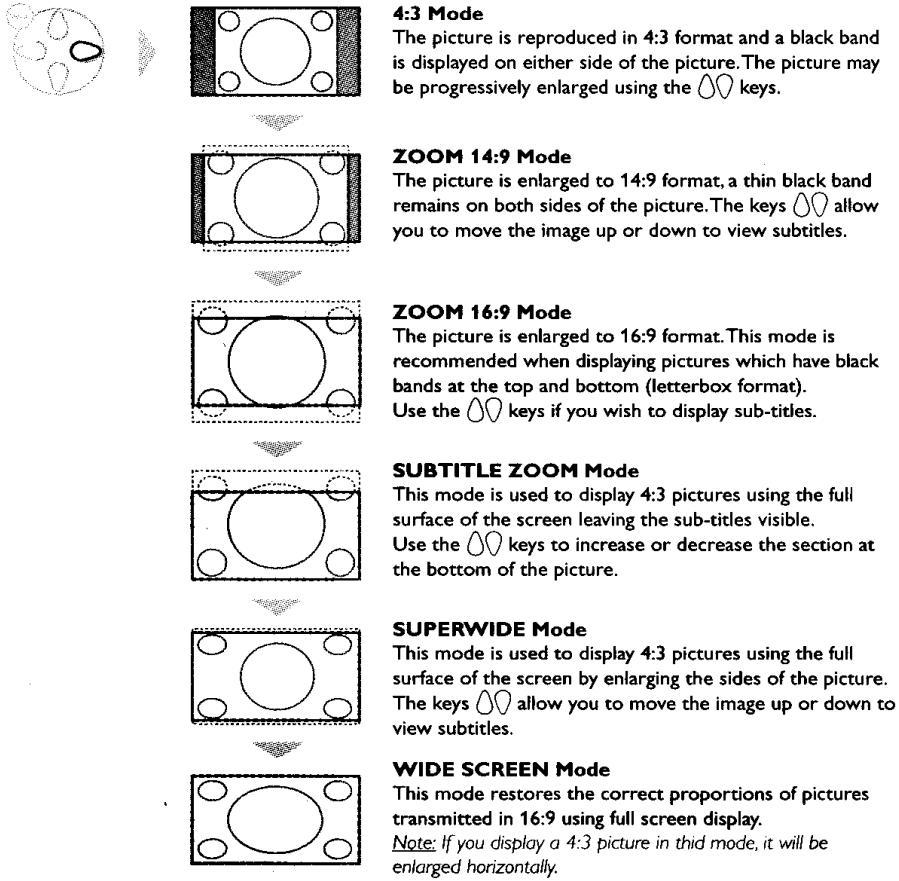
The pictures you receive may be transmitted in 16:9 format (wide screen) or 4:3 format (conventional screen). 4:3 pictures sometimes have a black band at the top and bottom of the screen (letterbox format). This function allows you to optimise the picture display on screen.

Automatic switching

This TV set is also equipped with automatic switching which will select the correct-screen format, provided the specific signals are transmitted with the programmes.
This automatic format can also be modified manually.

Using the different screen formats

Press the key (or) to select the different modes:
4:3, ZOOM 14:9, ZOOM 16:9, SUBTITLE ZOOM, SUPER ZOOM and WIDE SCREEN.
You can also access these settings with key .



4:3 Mode
The picture is reproduced in 4:3 format and a black band is displayed on either side of the picture. The picture may be progressively enlarged using the keys.

ZOOM 14:9 Mode
The picture is enlarged to 14:9 format, a thin black band remains on both sides of the picture. The keys allow you to move the image up or down to view subtitles.

ZOOM 16:9 Mode
The picture is enlarged to 16:9 format. This mode is recommended when displaying pictures which have black bands at the top and bottom (letterbox format).
Use the keys if you wish to display sub-titles.

SUBTITLE ZOOM Mode
This mode is used to display 4:3 pictures using the full surface of the screen leaving the sub-titles visible.
Use the keys to increase or decrease the section at the bottom of the picture.

SUPERWIDE Mode
This mode is used to display 4:3 pictures using the full surface of the screen by enlarging the sides of the picture.
The keys allow you to move the image up or down to view subtitles.

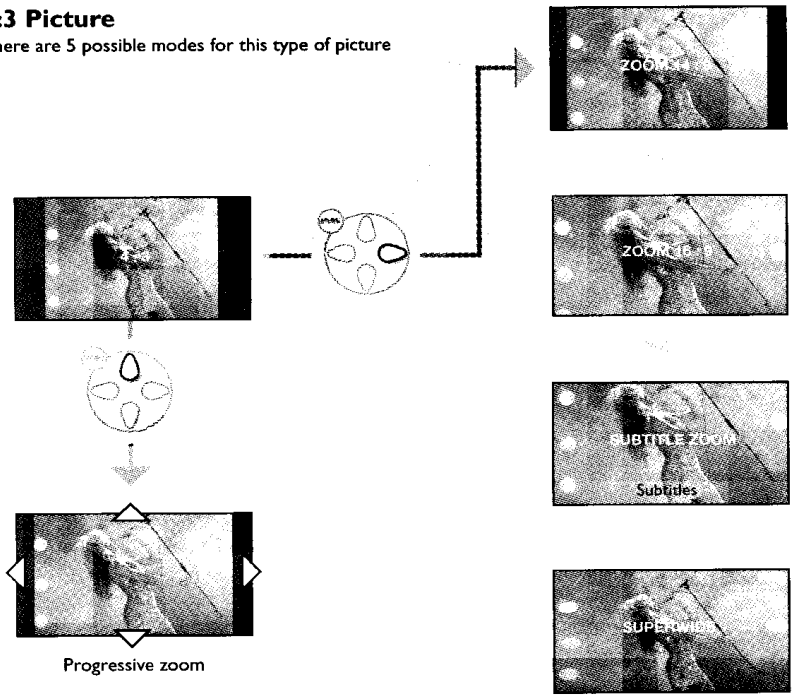
WIDE SCREEN Mode
This mode restores the correct proportions of pictures transmitted in 16:9 using full screen display.
Note: If you display a 4:3 picture in thid mode, it will be enlarged horizontally.

Selecting the correct mode

Different modes can be selected to suit different picture formats, use the following diagrams as a guide to which mode to use.

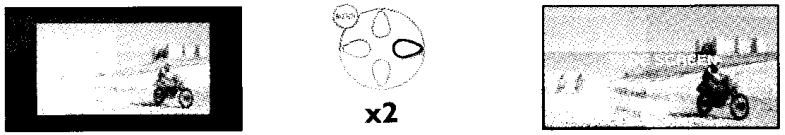
❶ 4:3 Picture

There are 5 possible modes for this type of picture



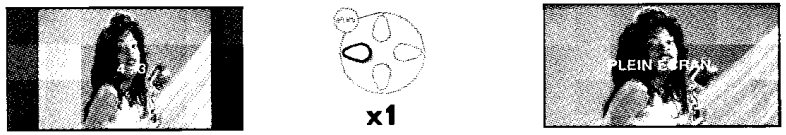
Progressive zoom

❷ 4:3 Picture Letterbox



x2

❸ 16:9 Picture

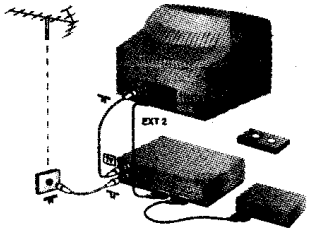


x1

Connecting peripheral equipment

The television has 2 external sockets situated at the back of the set (EXT1 and EXT2).
The EXT1 socket has audio and video inputs/outputs and RGB inputs.
The EXT2 socket has audio and video inputs/outputs and S-VHS inputs.

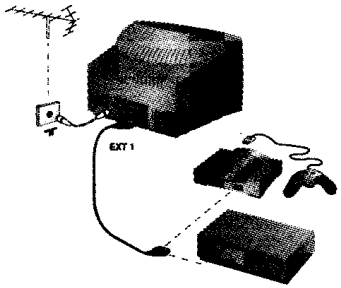
Video recorder



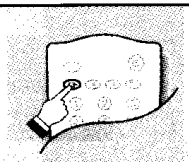
Video recorder (only)
Carry out the connections featured opposite. Use a good quality euroconnector cable.
If your video recorder does not have a euroconnector socket, the only connection possible is via the aerial cable. You will therefore need to tune in your video recorder's test signal and assign it programme number 0 (refer to manual store, p. 6).
To reproduce the video recorder picture, press ⓪.

Video recorder with decoder
Connect the decoder to the second euroconnector socket of the video recorder. You will then be able to record scrambled transmissions.

Other equipment



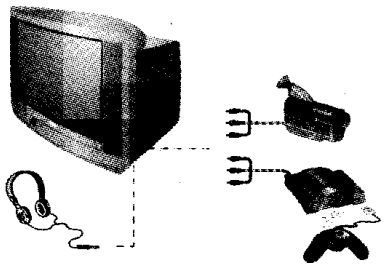
Satellite receiver, decoder, CDV, games, etc.
Carry out the connections featured opposite.
To optimise picture quality, connect the equipment which produces the RGB signals (digital decoder, games, etc.) to EXT1, and the equipment which produces the S-VHS signals (S-VHS and Hi-8 video recorders, certain CDV drives) to EXT2 and all other equipment to either EXT1 or EXT2.



To select connected equipment

Press the ⊡ key to select EXT1, EXT2, S-VHS2 (S-VHS signals from the EXT2 socket) and EXT3 for connections on the front panel.
Most equipment (decoder, video recorder) carries out the switching itself.

Connecting other appliances



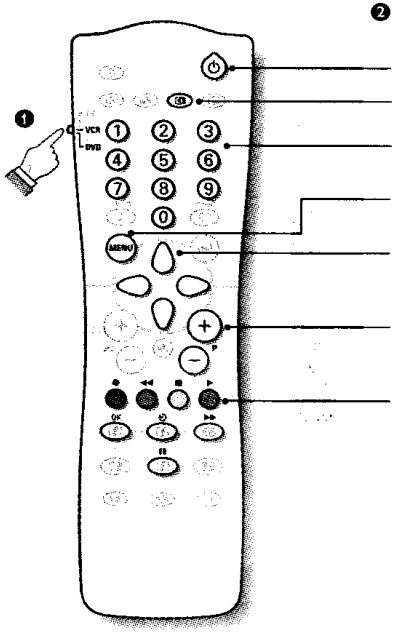
Connect other appliances as shown opposite.
Select EXT 3 by pressing ⊡.
For a monophonic camera, connect the sound signal to the AUDIO L input. Use the (I-II) key to reproduce the sound through the left and right TV speakers.

Headphones
Keys ⊖ ◿ ⊕ allow you to adjust the volume on the headphones and on the set. Press OK if you want to cut off the sound on the set.
The headphones must have an impedance of between 32 and 600 ohms.

TV / VCR / DVD mode selector

The remote control allows you to control the main functions of your video recorder or DVD.

❶ Set the switch on the side of the remote control to the required mode: TV, VCR (video recorder) or DVD.
❷ Then press one of the following keys:



- standby
- contrast + setting *
- enter a number
- bring up a menu *
- select (◯◯) and set (◯◯) *
- select programme,
- ● record *,
- ◀◀ rewind,
- ■ stop,
- ▶ play,
- ▶▶ fast forward,
- ⏲ programming *,
- OK confirm*
- ❚❚ pause

* *Some programming functions are not available on all models (cursors, menu, OK key, etc.).*
The remote control is compatible with all the video recorders in our range as well as models which use the RC5 signalling standard.

Tips

Poor reception
The proximity of mountains or high buildings may be responsible for ghost pictures, echoing or shadows. In this case, try manually adjusting your picture: see "fine tuning" (p.6) or modify the orientation of the outside aerial. Does your antenna enable you to receive broadcasts in this frequency range (UHF or VHF band)?
In the event of difficult reception (snowy picture) switch the NR on the PICTURE menu to ON. (p. 7).

No picture
Have you connected the aerial socket properly? Have you chosen the right system? (p. 6) Is the contrast or the brightness badly adjusted ? Press ◯ and readjust the PICTURE menu. Poorly connected euroconnector cables or aerial sockets are often the cause of picture or sound problems (sometimes the connectors can become half disconnected if the TV set is moved or turned). Check all connections.

Peripheral equipment gives a black and white picture
You have not selected the right socket with the ⊡ key: S-VHS2 instead of EXT2.
To play a video cassette, check that it has been recorded under the same standard (PAL, SECAM, NTSC) which can be replayed by the video recorder.

The remote control no longer works.
Check that the mode selector on the side of the remote control is set to TV.

No sound
If on certain channels you receive a picture but no sound, this means that you do not have the correct TV system. Modify the SYSTEM setting (p. 6).

Remote control
The TV set does not react to the remote control; the indicator on the set no longer flashes when you use the remote control? Replace the batteries.

Standby
When you switch the TV set on it remains in standby mode and the indication LOCKED is displayed when you use the keys on the TV set? The CHILD LOCK function is switched on (p. 8).
If the set receives no signal for 15 mins, it automatically goes into standby mode.
To save power, your set is fitted with components that give it a very low power consumption when in standby mode (less than 3 W).

Cleaning the set
Only use a clean, soft and lint-free cloth to clean the screen and the casing of your set. Do not use alcohol-based or solvent-based products.

Still no results?
If your TV set breaks down, never attempt to repair it yourself: contact your dealer's after-sales service.

Glossary

RGB Signals: These are 3 Red, Green and Blue video signals which directly drive the red, green and blue emitters in the cathode ray tube. Using these signals provides better picture quality.

S-VHS Signals: These are 2 separate Y/C video signals from the S-VHS and Hi-8 recording standards. The luminance signals Y (black and white) and chrominance signals C (colour) are recorded separately on the tape. This provides better picture quality than with standard video (VHS and 8 mm) where the Y/C signals are combined to provide only one video signal.

NICAM sound: Process by which digital sound can be transmitted.

System: Television pictures are not broadcast in the same way in all countries. There are different standards: BG, DK, I, and L L'. The SYSTEM setting (p. 4) is used to select these different standards. This is not to be confused with PAL or SECAM colour coding. Pal is used in the majority of European countries, Secam in France, the CIS and the majority of African countries.
The United States and Japan use a different system called NTSC. The inputs EXT1 and EXT2 are used to read NTSC coded recordings.

16:9: Refers to the ration between the length and height of the screen.
Wide screen televisions have a ration of 16/9, conventional screen TV sets have a ration of 4/3.

4. Mechanical instructions

4.1 Accessing the service connector (for ComPair)

1. Connect the ComPair cable to connector 0229 (in front of the Tuner).
2. Start ComPair and perform the diagnosis (for more info see chapter 5).

4.2 Removing the Rear Cover

1. Remove all the fixation screws of the rear cover.
2. Now the rear cover can be removed.

4.3 Service position

The following PWB's are present in this chassis (see also 'Chassis overview', chapter 1):

1. Large Signal Panel (LSP)
2. Small Signal Board (SSB)
3. Top Control panel
4. CRT panel (or PTP)
5. Side I/O panel
6. Mains Switch/LED panel

4.3.1 Service position LSP

Position 1: For better accessibility of the LSP, do the following:

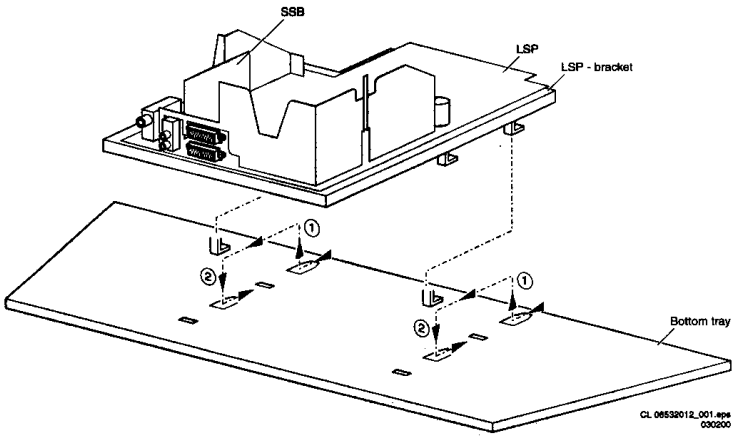


Figure 4-1

1. Remove the LSP-bracket from the bottom tray by pulling it backwards.
2. Hook the bracket in the first row of fixation holes of the cabinet bottom. In other words reposition the bracket from (1) to (2).

Position 2: To get access to the bottom side (solder side) of the LSP, do the following:

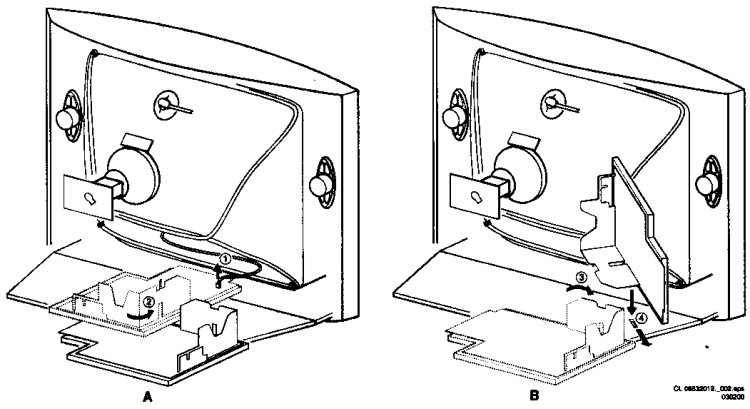


Figure 4-2

1. Disconnect the degaussing coil from the LSP by removing the cable on connector 0211 (1).
2. Release some of the wiring from their fixation clamps, in order to get room for repositioning the LSP.
3. Turn the chassis tray 90 degrees counter clockwise (2).
4. Flip the tray with the rear I/O panel towards the CRT (3).
5. Place the hook of the tray in the fixation hole at the right side of the cabinet bottom (4) and pull the chassis tray forward.

4.3.2 Service position SSB

In fact there is no predefined service position for the bottom (B-) side of the SSB. All relevant test points can be accessed in both service positions.

If IC's must be replaced: take the complete panel out of the SIMM-connector.

1. Put the LSP in service position 1 (as described above).
2. Release the 2 metal clamps at both sides of the SIMM-connector and the complete SSB can be taken out. It 'hinges' in the SIM-connector.

4.3.3 Accessing the Top Control panel

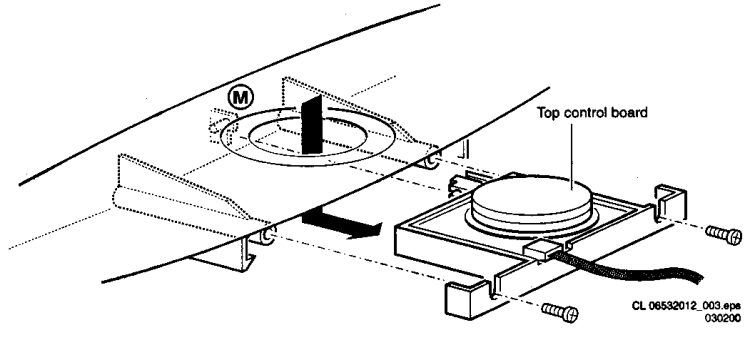


Figure 4-3

1. Remove the two fixation screws, which hold the panel.
2. Pull the board backward (w.o.w. release it from the front hinge).

4.3.4 Accessing the Side I/O panel

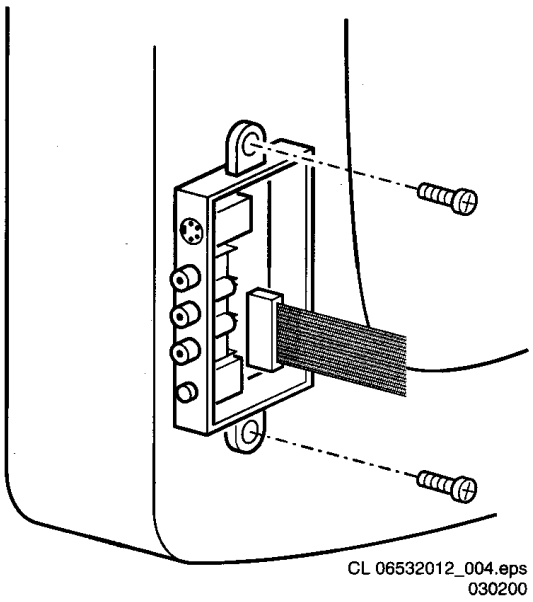


Figure 4-4

1. The complete Side I/O-assembly can easily be removed by unscrewing the 2 fixation screws.
2. The board can easily be lifted out of the bracket after releasing the 2 fixation clamps.

4.3.5 Accessing the Mains Switch/LED panel

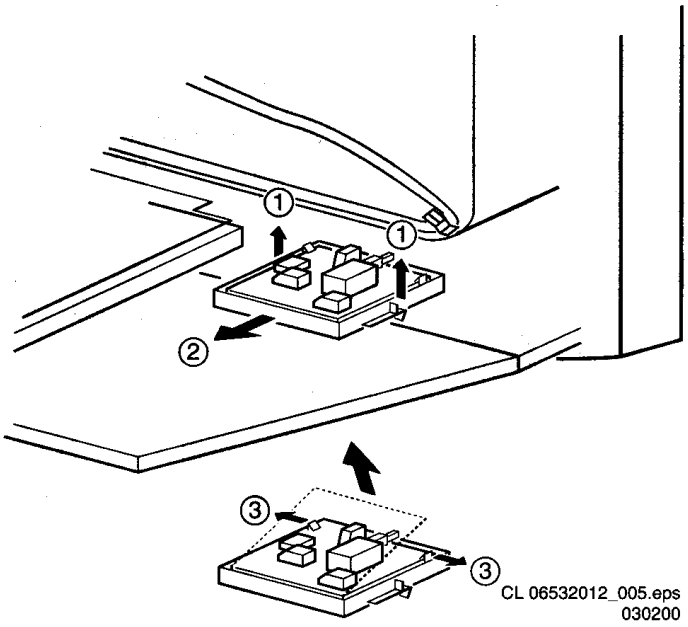


Figure 4-5

1. Release the two fixation clamps (1) by pushing them upward.
2. At the same time, the complete assy must be pulled backward (2).
3. If the board has to be removed, release the 2 clamps at the sides of the bracket and lift panel out (3).

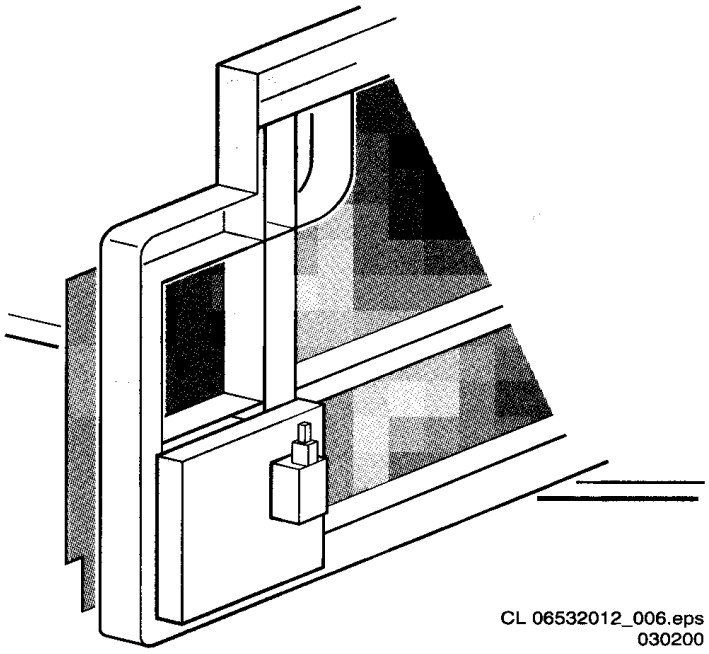


Figure 4-6

1. For easy measurements, panel can be clicked to the LSP bracket.

4.4 Mounting the Rear Cover

Before mounting the Rear Cover, some checks has to be performed:

- Check whether the Mains Cord is mounted correctly in the guiding brackets.
- Check whether all cables are replaced in their original position.

5. Service Modes, error messages and repair tips

In this chapter the following paragraphs are included:
5.1 Test points
5.2 Service Modes and Dealer Service Tool (DST)
5.3 Error code buffer and error codes
5.4 The "blinking LED" procedure
5.5 Trouble shooting tips
5.6 Customer Service Mode

5.1 Test points

The A10 chassis is equipped with test points in the service printing. These test points are referring to the functional blocks:
- A1-A2-A3, etc.: Test points for the audio processing circuitry [A6, C6]
- C1-C2-C3, etc.: Test points for the control circuitry [C8]
- F1-F2-F3, etc.: Test points for the frame drive and frame output circuitry [A3]
- I1-I2-I3, etc.: Test points for the intermediate frequency circuitry [A4, C1]
- L1-L2-L3, etc.: Test points for the line drive and line output circuitry [A2]
- P1-P2-P3, etc.: Test points for the power supply [A1]
- S1, S2, S3, etc.: Test points for the synchronisation circuitry [C1]
- V1-V2-V3, etc.: Test points for the video processing circuitry [B, C2, C3]

Measurements are performed under the following conditions:
Video: colour bar signal; audio: 3kHz left, 1kHz right

5.2 Service modes and Dealer Service Tool (DST)

For easy installation and diagnosis the dealer service tool (DST) RC7150 can be used. When there is no picture (to access the error code buffer via the OSD), DST can enable the functionality of displaying the contents of the entire error code buffer via the blinking LED procedure.

5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with presets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I. For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the A10 chassis, download code 4 should be used).

5.2.2 Diagnose features for the service engineer

A10 sets can be put in the two service modes via the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM). SDM can also be entered by short circuiting the jumpers 9261 and 9262 on the chassis with a screwdriver.

Service Default Mode (SDM)
The purpose of the SDM is:
- provide a situation with predefined settings to get the same measurements as in this manual
- start the blinking LED procedure
- have the possibility to override the 5V protection

Entering the SDM:
- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM)
- Standard RC sequence 0-6-2-5-9-6 followed by pressing the "MENU"-button
- By shorting jumpers 9261 and 9262 on the monocarrier while switching on the set

By temporarily shorting jumper 9261 and 9262 when switching on the set, the 5V protection is disabled.
CAUTION ! Overriding the 5V protection should only be used for a short period of time. In case of S/W protections (error 1-4) the set will shutdown after 15 sec.
For recognition of the SDM, "SDM" is displayed at the upper right side of the screen.

SDM Menu

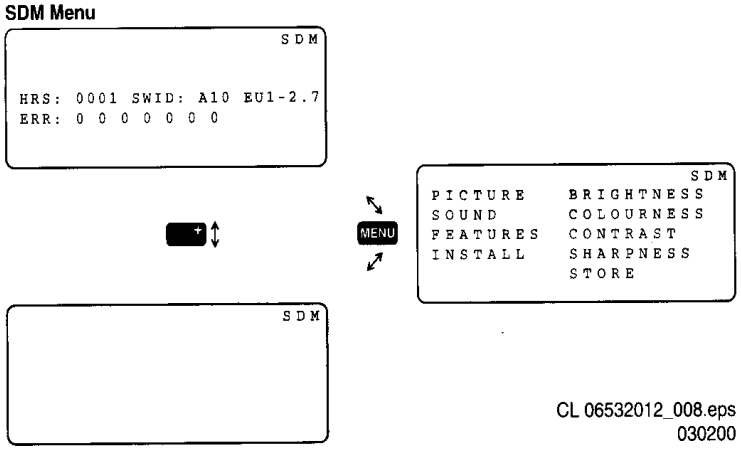


Figure 5-1

Exit the SDM:
- Press the "EXIT"-button on the DST
- Switch the set to Standby (the error buffer is also cleared)

Note: When the mains power is switched off while the set is in SDM, the set will switch to SDM immediately when the mains is switched on again.
The SDM sets the following pre-defined conditions:
- PAL/Secam sets: tuning at 475.25 MHz PAL
- NTSC sets: tuning at channel 3 (61.25MHz)

Volume level is set to 25% (of the maximum volume level). Other picture and sound settings are set to 50%. The following functions are switched off in SDM (and after leaving SDM):
- Timer
- Sleep timer

The following functions are disabled during SDM (and enabled after leaving SDM)
- Parental lock
- Blue mute
- Hospitality Mode
- No-ident Timer (normally the set is automatically switched off when no video signal (IDENT) was received for 15 minutes).

All other controls operate normally.

Special functions in SDM

Access to normal user menu
Pressing the "MENU" button on the remote control switches between the SDM and the normal user menus (with the SDM mode still active in the background)

Channel search
Pressing the "P+" button of the remote control starts a tuning search. Search is indicated by a blinking LED (this stops when a transmitter is found; the transmitter is stored on the highest channel number, typically this is 99 and the TV switches to this preset)

Error buffer
Pressing the "OSD" button of the remote control shows/hides the error buffer. OSD can be hidden to prevent interference with oscillogram measurements.

Access to SAM
By pressing the "VOLUME +" and "VOLUME -" buttons on the local keyboard simultaneously the set switches from SDM to SAM.

Service Alignment Mode (SAM)
The purpose of the SAM is:
- to do alignments
- Change option settings
- display/clear the error code buffer values.

Entering SAM:
- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SDM)
- By pressing the "VOLUME +" and "VOLUME -" key on the local keyboard simultaneously when the set is in SDM
- Standard RC sequence 0-6-2-5-9-6 followed by pressing the "OSD"-button

Exit SAM:
Switch the set to Standby (the error buffer will be erased)
Note: When the mains power is switched off while the set is in SAM, the set will enter to SAM immediately when the mains is switched on again.
In the SAM the following information is displayed on the screen:

SAM Menu

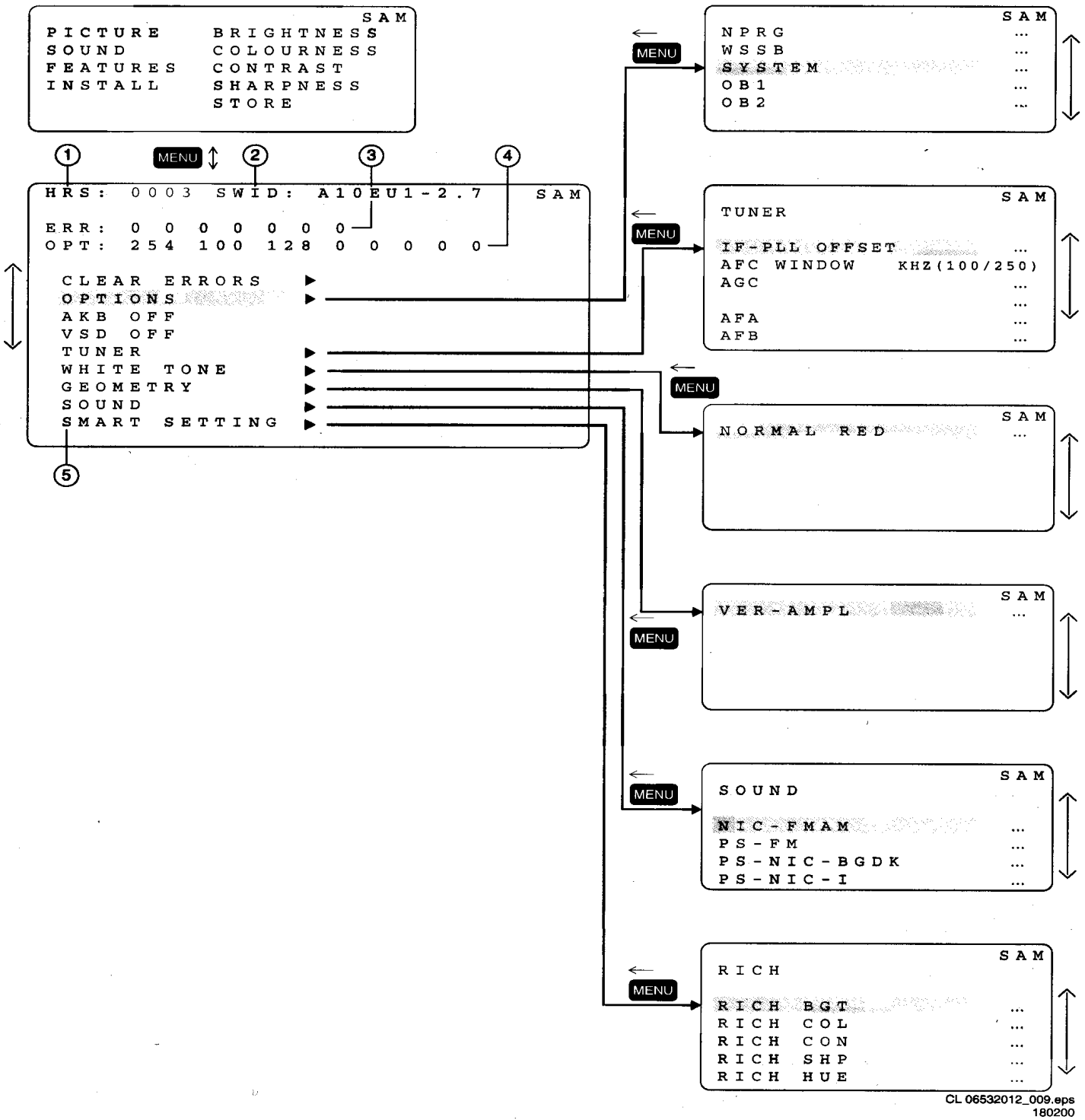


Figure 5-2

Explanation notes/references:

1. Operation hours timer (hexadecimal)
2. Software identification of the main micro controller (A10BBC-X.Y)
   - A10 is the chassis name for A10
   - BBC is 2 letter and 1 digit combination to indicate the software type and the supported languages:
   - X = (main version number)
   - Y = (subversion number)
3. Error buffer (7 errors possible)
4. Option bytes (8 codes possible), summary of options are explained below
5. Sub menus are listed in a scroll-menu.

SAM menu control

Menu items can be selected with the cursor UP/DOWN key. The selected item will be highlighted. When not all menu items fit on the screen, moving the cursor UP/DOWN will display the next/previous menu items.
With the cursor LEFT/RIGHT keys, it is possible to:

- (de)activate the selected menu item (e.g. GEOMETRY)
- change the value of the selected menu item (e.g VER-SLOPE)
- activate the selected submenu (e.g SERV-BLK)

Access to normal user menu

Pressing the "MENU" button on the remote control switches between the SDM and the normal user menus (with the SAM mode still active in the background). Pressing the "MENU" key in a submenu will go to the previous menu.

The menus and submenus

CLEAR ERRORS

Erasing the contents of the error buffer. Select the CLEAR ERRORS menu item and press the MENU RIGHT key. The contents of the error buffer is cleared.
The functionality of the OPTIONS and ALIGNMENTS (TUNER, WHITE TONE, GEOMETRY, SOUND and SMART SETTING) sub menus is described in chapter 8.

5.3 Error code buffer and error codes

5.3.1 Error code buffer

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. when an error occurs that is not yet in the error code buffer, the error is written at the left side and all other errors shift one position to the right.
The error code buffer will be cleared in the following cases:

- by activating the "CLEAR ERRORS" in SAM menu
  - exiting SDM or SAM with the "Standby" command on the remote control
  - transmitting the commands "DIAGNOSE 99 OK" with the DST (RC7150) or with ComPair
- Automatically reset if its contents has not changed for 50 hours

By leaving SDM or SAM with the mains switch, the error buffer is not reset.

Examples:
ERROR: 0 0 0 0 0 0 0 : No errors detected
ERROR: 6 0 0 0 0 0 0 : Error code 6 is the last and only detected error
ERROR: 9 6 0 0 0 0 0 : Error code 6 was first detected and error code 9 is the last detected (newest) error
The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. See paragraph 5.4 "The blinking LED procedure ".

5.3.2 Error codes

In case of non-intermittent faults, clear the error buffer before starting the repair, to prevent that "old" error codes are present. If possible check the entire content of the error buffers. In some situations an error code is only the result of another error code (and not the actual cause).
Note: a fault in the protection detection circuitry can also lead to a protection.
Error 0 = No error
Error 1 = X-ray protection, E/W protection and/or IBeam
X-ray protection, E/W protection and/or IBeam; set is switched to protection; error code 1 is placed in the error buffer; the LED will blink 1 time (repeatedly). If this happens, isolate each circuit to determine the cause. These circuits are:

- X-Ray protection - PROTN

If this protection is active, the most likely cause is the LOT. Detection via pin 3 of the BOCMA - item 7301.

- EW protection - PROT-UP

If this protection is active, the causes could be one of the following;

- bad contacts of:
  - horizontal deflection coil
  - linearity coil 5417
  - S-correction capacitor 2418/2419
  - flyback capacitor 2414/2416
  - line output stage
- short circuit of:
  - flyback diode 6414
  - EW transformer (bridge coil) 5478/5479 or 5474/5475/5476 (version dependent)
  - EW driver 7470
- High beam current protection - IBeam

As the name implies, the cause of this protection is a too high beam current (bright screen with flyback lines). Check whether the +200V supply to the CRT panel is present. If the voltage is present, the most like cause is the CRT panel or the picture tube. Disconnect the CRT panel to determine the cause. If the +200V voltage is not present, check R3840 at CRT-panel and R3445 & D6445 at main panel.
Error 2 = Vertical protection - VFB
If this protection is active, the cause could be one of the following (most likely in the vertical output stage):

- 7501 is faulty
- poor contact or open circuit of deflection coil
- +13V-VERT and/or -13V not present

Error 3 = Reserved
Error 4 = +5V protection
5V protection active; set is switched to protection; error code 4 is placed in the error buffer; the LED will blink 4 times (repeatedly). A 5V failure can cause a drop in the 5V supply output, resulting in an undefined behaviour of the set. Therefore, all I^2C devices connected to the 5V supply are constantly monitored. When none of these devices responds to the micro controller for a prolonged time, the micro controller assumes that there is a failure in the 5V supply.
By starting up the set with the service jumpers shorted, the 5V protection is disabled and it is easier to determine the cause.
+5V protection will be activated when these I^2C devices fail (no I^2C communication):

- Main Tuner 1125 on main panel
- ITT sound processor MSP34xx (7064) on the SSB

The following tips are useful to isolate the problem area after overriding the +5V protection. Determine whether:

1. The +5V source is working properly; isolate coil 5430 and jumper 9044 and measure the +5V
2. ITT sound processor circuit is loading the +5V; isolate coil 5430
3. The tuner is loading the +5V source; isolate jumper 9044
4. Main tuner circuit is loading the +5V source; isolate coil 5261

Caution! Overriding the 5V protection when there is a 5V failure can increase the temperature in the set and may cause permanent damage to components. Do not override the 5V protection for a prolonged time.
Error 5 = Reserved
Error 6 = General I^2C error. This will occur in the following cases:

- SCL or SDA is shorted to ground
- SCL is shorted to SDA
- SDA or SCL connection at the micro controller is open circuit.

Error 7 = BC-loop not stabilised (BCF = 1) Black current loop instability protection. The possible cause could be a defect in one or more of the RGB amplifiers, RGB guns or RGB driving signals.
Error 8 = BOCMA IC TDA888xx I^2C communication failure. BOCMA (item 7301 on SSB) is corrupted or the I^2C line to the BOCMA is low or no supply voltage present at pin 14 and/or pin 60 (3V3)
Error 9 = BOCMA IC TDA888xx 8V failure (SUP bit). No supply voltage at pin 53. Check NFR 3331 and coil 5333.
Error 10 =NVM I^2C error. NV memory (EEPROM - item 7066) does not respond to the micro controller.
Error 11 = micro controller / NV Memory identification error. During the last start-up the NVM and the micro controller did not recognize each other (e.g. one of them was replaced or the NVM memory has been changed/adapted or lost), therefore the NVM was loaded with default values.
Error 12 = Microprocessor (Painter - item 7064) internal RAM test failure.
Error 13 =Main Tuner I^2C failure UV13xx. Tuner (item 1225) is corrupted or the I^2C line to the Tuner is low or not supply votage at pin 9, pin 6 or 7 of the tuner.
Error 14 =Sound processor I^2C error (MSP34xx -). Sound controller MSP3400 or MSP3410 does not respond to the micro controller.
Error 15 =SRAM IC uPD431000A-B test failure (item - 7070).
Error 16 =PIP/DW Tuner I^2C error. The Tuner (TEDE9 - item 1900) on the PIP-panel does not respond to the micro controller.
Error 17 = PIP IC M65669SP I^2C failure (item 7803) or Double Window IC SAB9081 I^2C failure.
Error18 = I/O expander IC 62320P I^2C failure (item 7910 on PIP panel).
Error 19 = Guide+ I^2C failure (LC27016B - item 7005). USA only.
Error 20 = V-chip for PIP, IC ZiLOG 86130 I^2C failure USA only.
Error 21 = NV clock IC MK41T56 I^2C failure at mono board - Item 7011 at A7.
Error 22 = Reserved.
Error 23 = Second BOCMA IC TDA888xx (on DW panel) I^2C communication failure.
Error 24/29 = Reserved.

– Error codes 1,2, and 4 are protection codes and in this case supplies of some circuits will be switched off. Also in protection, the LED will blink the number of times equivalent to the most recent error code.

5.3.3 Error code table

Error code	Error description	Possible defective components
0	No error detected	-
1	X-ray protection/ EW and/or High beam protection active	LOT, Line deflection circuit, EW-circuit or CRT amplifier circuit, picture tube or +200V missing
2	Vertical protection	Vertical circuit is defective
3	Reserved	
4	5V protection active	+5V supply line is low or short circuit
5	Reserved	
6	General I^2C bus error	I^2C bus s/c or o/c on uP
7	BC-loop not stabilised	RGB amplifiers, RGB guns or RGB driving signals of BOCMA
8	BOCMA I^2C error	IC 7301
9	BOCMA 8V supply failure	IC 7301 and R3331
10	NVM I^2C error	IC7066
11	NVM identification failure	IC7066
12	uProcessor internal RAM test failure	IC 7064
13	Main Tuner I^2C error	IC 1225 - UV13xx
14	Sound processor I^2C error	IC 7 (2CS/Nicam)
15	SRAM I^2C error	IC 7070
16	PIP tuner I^2C error	IC 1900 - TEDE9
17	PIP IC I^2C error or DW IC I^2C error	IC M656695P or IC SAB9081
18	I/O expander IC 62320P I^2C error	IC 62320P - item 7910
19	Guide+ I^2C error	IC LC27016B - item 7005
20	V-chip for PIP - I^2C error	IC ZILOG 86130 -
21	NV clock - I^2C error	IC MK41T56 - item 7011
22	Reserved	
23	Second BOCMA IC on DW panel - I^2C error	IC TDA888xx - item

5.4 The "blinking LED" procedure

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture.

– When the SDM is entered, the LED will blink the number of times, equal to the value of the error code.

When the SDM is entered, the LED will blink the contents of the error-buffer. Error-codes ≥ 10 are shown as followed. A long blink of 750 msec. which is an indication of the decimal digit, followed by a pause of 1500 msec. followed by n short blinks. When all the error-codes are displayed, the sequence is finished with a LED display of 3 seconds. The sequence starts again.

Example:

Error code position 1 2 3 4 5

Error buffer: 12 9 6 0 0

- after entering SDM: 1 long blink of 750 msec. + pause of 1500 msec + 2 short blinks - pause of 3 sec. - 9 short blinks - pause of 3 sec. - 6 short blinks - pause of 3 sec. - long blink of 3 sec. -- etc.

NOTE: If errors 1, 2 or 4 occurs the LED ALWAYS blinks the last occurred error, even if the set in NOT in service mode.

5.5 TROUBLE SHOOTING TIPS

In this paragraph some trouble shooting tips for the deflection and power supply circuitry are described. For detailed diagnostics, check the fault finding tree.

5.5.1 THE DEFLECTION CIRCUIT:

– Measure if the VBAT (140V) is present across 2939/2940 (A1 POWER SUPPLY). If the voltage is not present, disconnect jumper 9936 and 9937 (see A1 Power Supply) The whole Line Deflection stage is now disconnected. If the voltage is present then the problem might be caused by the deflection circuit. Possibilities:
  – Transistor 7410 is defective
  – The driver circuit around transistor 7481 is faulty
  – No horizontal drive signal coming from the BOCMA IC 7301 pin 56 on the SSB

1. Note: If the C and E of 7410 are shorted, hick-up noise can be heard from the power supply circuit.
2. To determine whether the fault is present in the line deflection circuit (A2 LINE DEFLECTION) or in the EW circuit/panel (screen size above 21"), insert jumper into position numbers 9409 (in this case the EW protection is disabled). If the basic deflection is working (picture is parabolic distorted), then the fault is located in the EW circuit/panel. If there is no hor. deflection, the fault is present in the basic deflection circuitry.
3. Also take note of protection circuits in the line output stage. If any of these circuits are activated, the set will shut down. Depending on protections, the LED will blink according to the fault defined. In order to determine which protection circuit is active, isolation of circuits is necessary. These protection circuits are:
4. High beam protection. See error 1 - IBeam.
5. X-ray protection : See error 1

If the high beam protection or the X-ray protection is active, it will switch the set to protection and the SDM is activated. The service LED blinks repetitively 1 time. If this happen, isolate each circuit to determine the cause

5.5.2 THE POWER SUPPLY.

To trouble shoot the A10 SMPS, first check the +5V_STBY voltage on IC7968, pin 3/4. If this voltage is not present, check fuse 1961 and D6961. If 1906 or D6917 is not open circuit, the problem might be caused on the primary side of the switching supply. Check the output of the bridge diodes on the cathode side of D6912/D6913 or D6915 - pin 1 for approximately 300V DC. If this voltage is missing, check the bridge diodes and the fuse. If fuse F1900 is found open, check IC7921 (circuit A1) between pins 3 and 2 to make sure that there is no short circuit present. If the 300V DC is present on pin 3 of IC7902, check for a startup voltage of 16V on pin 4 of IC7921. If startup voltage is not present, check if R3914 is open; a short circuit between pin 4 and 5 will also cause this problem. It is necessary to have a feedback signal from the hot secondary side of switch mode transformer T5912 at pin 8 and pin 9 for the power supply to oscillate. If this startup voltage is present on pin 4 of IC7902 and the supply is not oscillating, check R3929 and D6929.

The A10 power supply has been designed with Over Voltage Protection (OVP). To determined whether OVP is active, check whether VBAT - 141V is present at IC7971 pin 1. If not, check the components D6938, C2939 and C2940 and L5941. If these components are O.K., then check voltage at pin 3 of IC 7942. If this voltage is not present check fuse 1941 and fuse 1942. Replace if necessary. If dc-voltage is present at pin 3, replace opto-coupler 7929.

Another way to confirm whether OVP is active, is to measure the voltage with an oscilloscope at IC7902 pin 4. If the voltage is fluctuating between 11-14V, then check the components as described in the above mentioned paragraph.

5.6 Customer Service Mode (CSM)

All A10.0 sets are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and deactivated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible.

5.6.1 Entering the Customer Service Mode.

The Customer Service Mode can be switched on:

– by pressing simultaneously the button (MUTE) on the remote control and any key on the control buttons (P+, P-, VOL +, VOL -) on the TV for at least 4 seconds.

When the CSM is activated:

- picture and sound settings are set to nominal levels
- modes that interfere with the behaviour of the set are switched off (sleep timer, auto standby, etc.)

5.6.2 Exit the Customer Service Mode.

The Customer Service Mode will be switched off after:

– pressing any key on the remote control handset (except "P+" or "P-")
– switching off the TV set with the mains switch.

All settings that were changed at activation of CSM are set back to the initial values

5.6.3 The Customer Service Mode information screen

After switching on the Customer Service Mode the following screen will appear.

CSM Menu

```
                                                    CSM
1   HRS: 0005 SWID: A10EU1-2.7
2   CODES: 0 0 0 0 0 0 0
3   OPT: 254 100 128 0 0 0 0 0
4   SYSTEM: EUROPE      11 SOUND: MONO
5   NO SIGNAL           12 VOLUME:          ...
6                       13 BALANCE: +/-     ...
7                       14 HUE:     +/-     ...
8                       15 COLOUR:          ...
9                       16 BRIGHTNESS:      ...
10  SOURCE: 1           17 CONTRAST:        ...
```

CL 06532012_010.eps
070200

Figure 5-3

The Customer Service Menu shows the following information:
– Line 1 : "HRS : nnnnn" and SWID : "A10BBC-X.Y"
HRS : Hexadecimal counter of operating hours. (Standby hours are not counted as operating hours) .
SWID : (Software identification of the main micro controller) See paragraph 5.2. Details on available software versions can be found in the chapter "Software Survey" of the publication "Product Survey - Colour Television".
– Line 2 : "CODES : xx xx xx xx xx xx xx "
Error code buffer (see paragraph 5.3). Displays the last 7 errors of the error code buffer.
– Line 3 : "OPT xxx xxx xxx xxx xxx xxx xxx xxx"
Option bytes. Software and hardware functionality of the A10.0 is controlled by option bits. An option byte or option number represents 8 of those bits. Each option number is displayed as a decimal number between 0 and 255. The set may not work correctly when an incorrect option code is set. See chapter 8 for more information on correct option settings
– Line 4: "SYSTEM : EUROPE"
Indicates which colour and sound system is installed for this preset:
– PAL BG
– PAL I
– PAL DK
– SECAM BG
– SECAM DK
– SECAM LL'
Complaints that may be caused by an incorrect system setting:
- no colours
- colours not correct
- unstable picture
- noise in picture

To change the system setting of a preset:
1. press the "MENU" button on the remote control
2. select the INSTALL sub menu
3. select the MANUAL STORE sub menu
4. select and change the SYSTEM setting until picture and sound are correct
5. select the STORE menu item

– Line 5 : "NO SIGNAL"
Indicates that the set is not receiving an "ident" signal on the selected source.
- no or bad antenna signal; connect a proper antenna signal
- antenna not connected; connect the antenna
- no channel / preset is stored at this program number; go to the INSTALL menu and store a proper channel at this program number
- the tuner is faulty (in this case the CODES line will contain number 13 or 16); check the tuner and replace/repair if necessary

Note: On some models, BLUE MUTE is displayed (if the BM option is ON) when no signal is received.
– Line 6 : "TIMER ON "
Indicates that the on/off timer is running. Complaints that may be caused by the activation of the sleep timer.
Without using the remote control of the local keybpard the set is switching:
- on from standby:
- to a different channel

To switch off the activation timer:
1. select "TIMER" in the "FEATURE" menu
2. select "ACTIVATE' in the "TIMER" menu
3. set to "OFF" with the left/right cursor keys

– Line 7 : "CHANNEL BLOCKED"
Indicates that all channels are locked except the selected channel. Complaint that may be caused by locked channels:
– TV cannot be switched on from standby with the local keyboard buttons
– "P+" and "P-" buttons on local keyboard do not function

To disable the LOCK feature:
1. select "FEATURE" menu (with the Remote Control)
2. select "LOCK" (with the RC)
3. set to "OFF"

– Line 8 : "NOT PREFERED"
Indicates that at least one channel is deleted as a preferred channel (by default, all channels are skipped. Note that "SKIPPED" will always be displayed in CSM unless all the channels are not skipped. A channel can be added as a selected channel to the list of preferred channels:
1. select "INSTALL" menu
2. select "CHANNEL EDIT"
3. select "ADD/DELETE"
4. set to "ADD" with the left/right cursor keys

– Line 9 : "HOTEL MODE ON"
Inidcates that the Hotel mode has been activated.
– Line 10 : "SOURCE"
Indicates which SOURCE is installed for this preset.
EXT1, SVHS2, EXT2, Tuner.
– Line 11 : "SOUND"
Inicates which sound mode is installed for this preset.
Mono, NICAM, Stereo, L1, L2, SAP, Virtual and Digital
– Line 12 : "VOLUME"
Value indicates level at entry CSM.
– Line 13 : "BALANCE"
Value indicates level at entry CSM.
– Line 14 : "HUE"
Value indicates level at entry CSM.
– Line 15 : "COLOR"
Value indicates level at entry CSM.
– Line 16 : "BRIGHTNESS"
Value indicates level at entry CSM.
– Line 17 : "CONTRAST"
Value indicates level at entry CSM.

5.6.4 Solving other problems

TV switched off or changed channel without any user action
Set switches off after "TV SWITCHING OFF" was displayed
Auto standby switched the set off because:
- there was no ident signal for more than 15 minutes
- there was no remote control signal received or local key pressed for > 2 hours

See chapter 8 for a description on the options to enable/disable auto standby

Picture problems

Picture too dark or too bright
– Press "Smart Picture" button on the remote control. In case the picture improves, increase / decrease the brightness value or increase / decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes
– After switching on the Customer Service Mode the picture is OK. Increase / decrease the brightness value or increase / decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes

White line around picture elements and text

- press "Smart Picture" button on the remote control. In case the picture improves, decrease the sharpness value. The new "Personal Preference" value is automatically stored after 3 minutes
- after switching on the Customer Service Mode the picture is OK. Decrease the sharpness value. The new "Personal Preference" value is automatically stored after 3 minutes

Snowy picture

- check the "NOT TUNED" section of the Customer Service Mode screen

Snowy picture and/or unstable picture

- a scrambled or decoded signal is received

Black and white picture

- press "Smart Picture" button on the remote control. In case picture improves, increase the colour value. The new "Personal Preference" value is automatically stored after 3 minutes
- after switching on the Customer Service Mode the picture is OK. Increase the colour value. The new "Personal Preference" value is automatically stored after 3 minutes

Menu text not sharp enough

- press "Smart Picture" button on the remote control. In case the picture improves, decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes
- after switching on the Customer Service Mode the picture is OK. Decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes

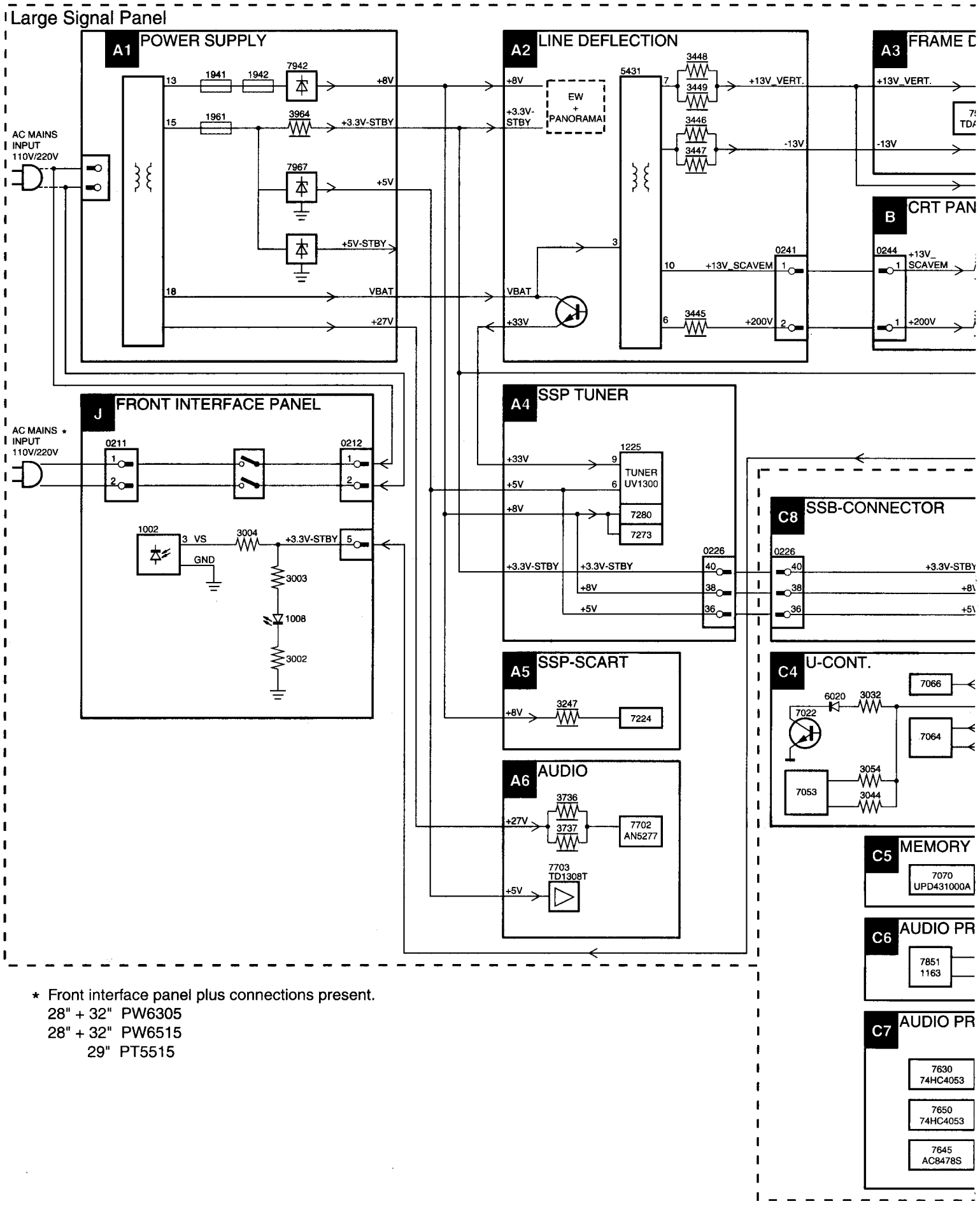
Sound problems

No sound or sound too loud (after channel change / switching on)

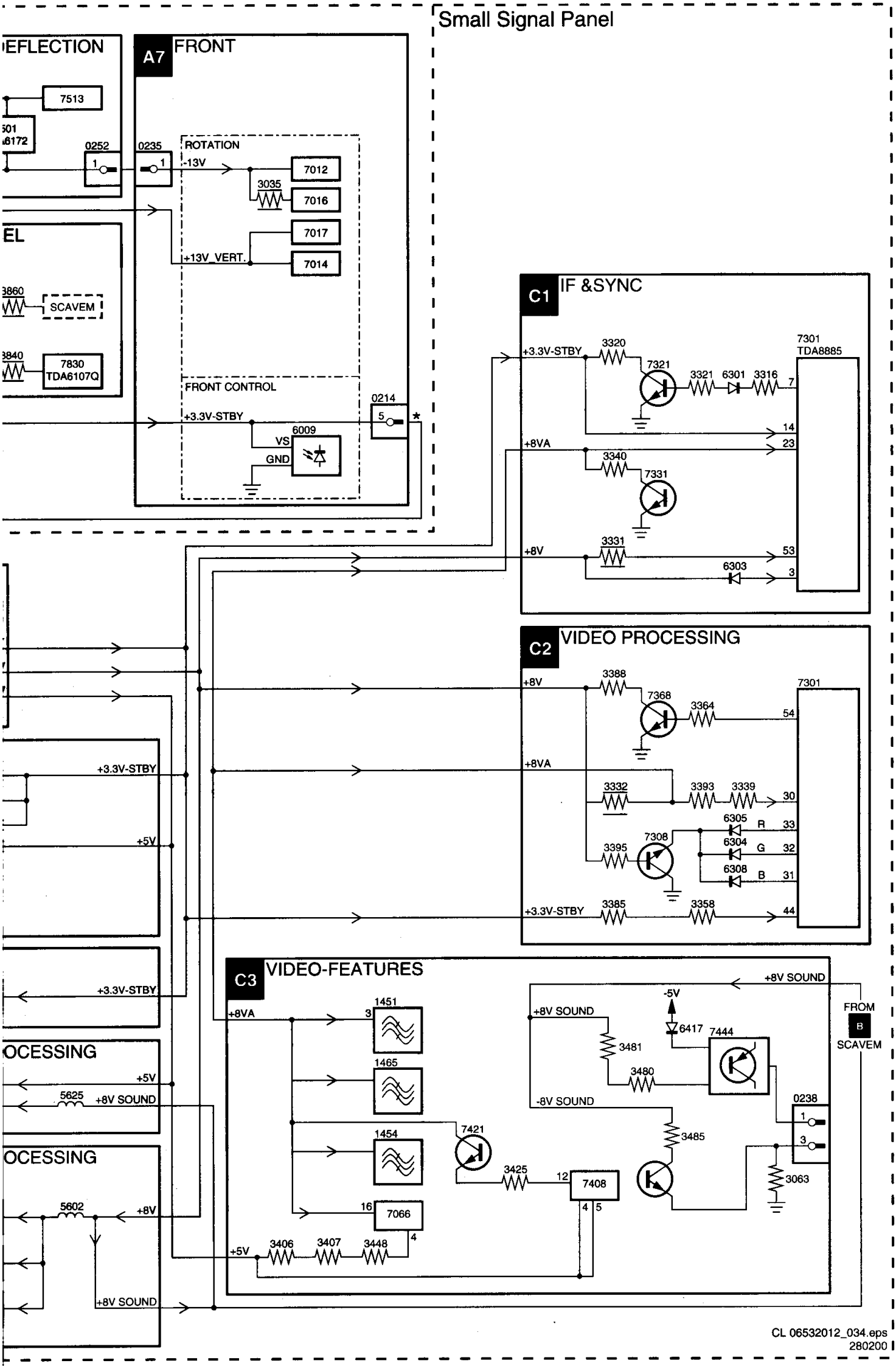
- after switching on the Customer Service Mode the volume is OK. Increase / decrease the volume level. The new "Personal Preference" value is automatically stored after 3 minutes

6. Blockdiagram, supply diagram and testpointsoverviews.

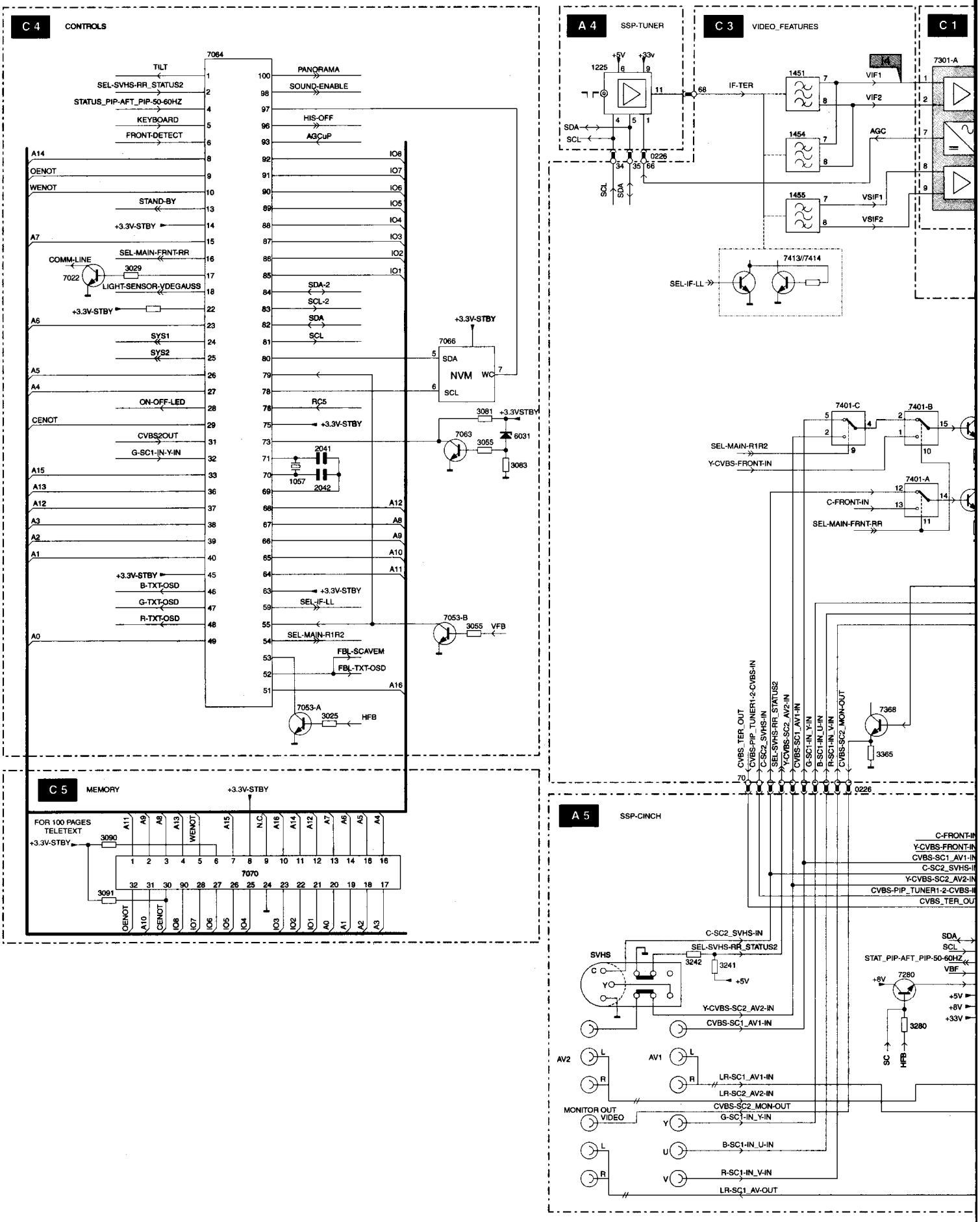
Supply voltage diagram

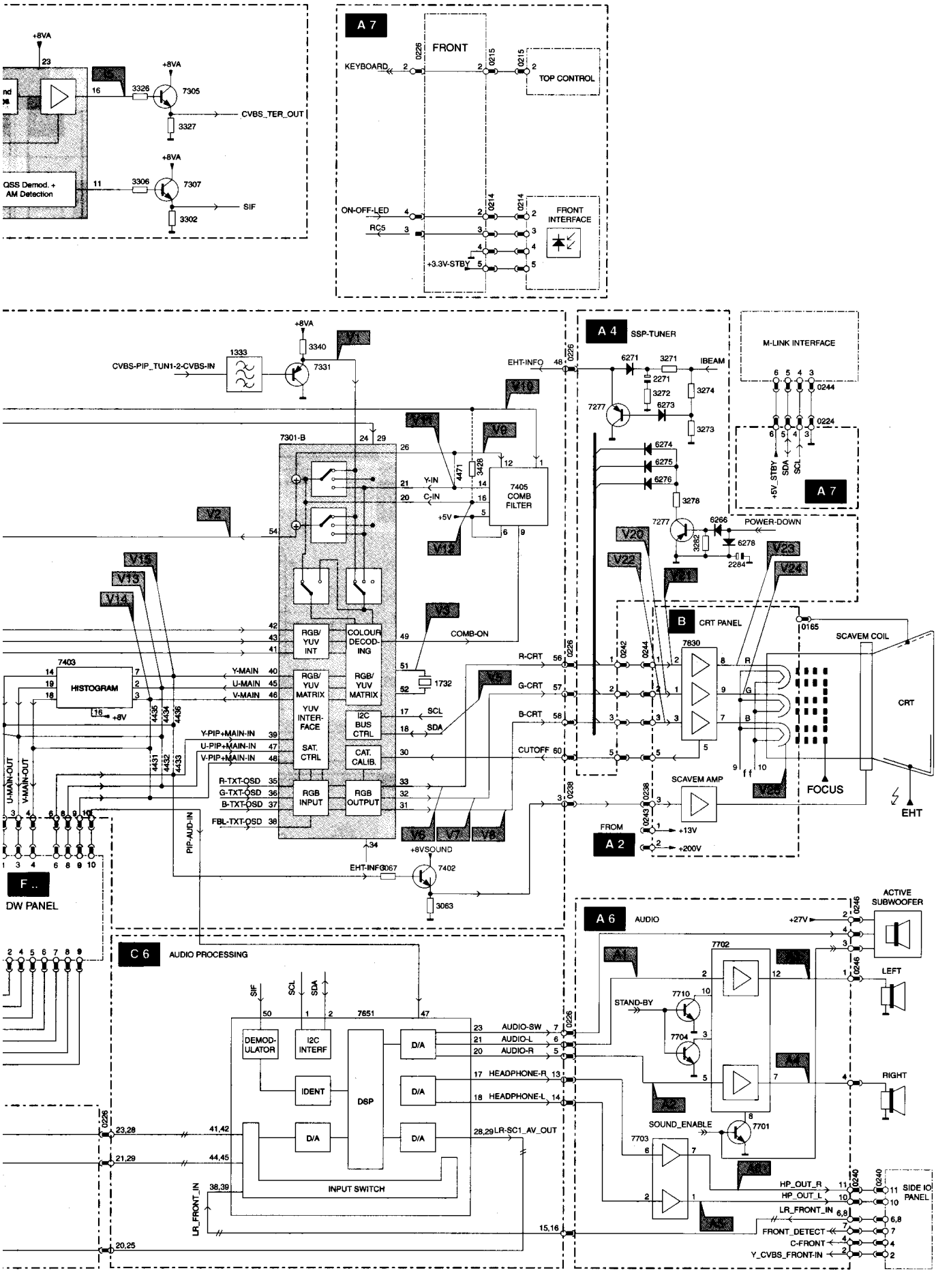


* Front interface panel plus connections present.
28" + 32" PW6305
28" + 32" PW6515
29" PT5515


Small Signal Panel
EFLECTION
7513
0252
A7 FRONT
0235
ROTATION
-13V
7012
3035
7016
7017
+13V_VERT.
7014
EL
3860
SCAVEM
3840
7830
TDA6107Q
FRONT CONTROL
0214
+3.3V-STBY
6009
VS
GND
C1 IF &SYNC
+3.3V-STBY
3320
7321
3321
6301
3316
7301
TDA8885
+8VA
3340
7331
+8V
3331
6303
C2 VIDEO PROCESSING
3388
7368
3364
3332
3393
3339
6305
R
6304
G
6308
B
7308
3395
3385
3358
C3 VIDEO-FEATURES
+8V SOUND
-5V
6417
7444
3481
3480
FROM
B
SCAVEM
1451
1465
1454
7421
3425
7408
3485
0238
3063
7066
3406
3407
3448
5625
5602
CL 06532012_034.eps
280200

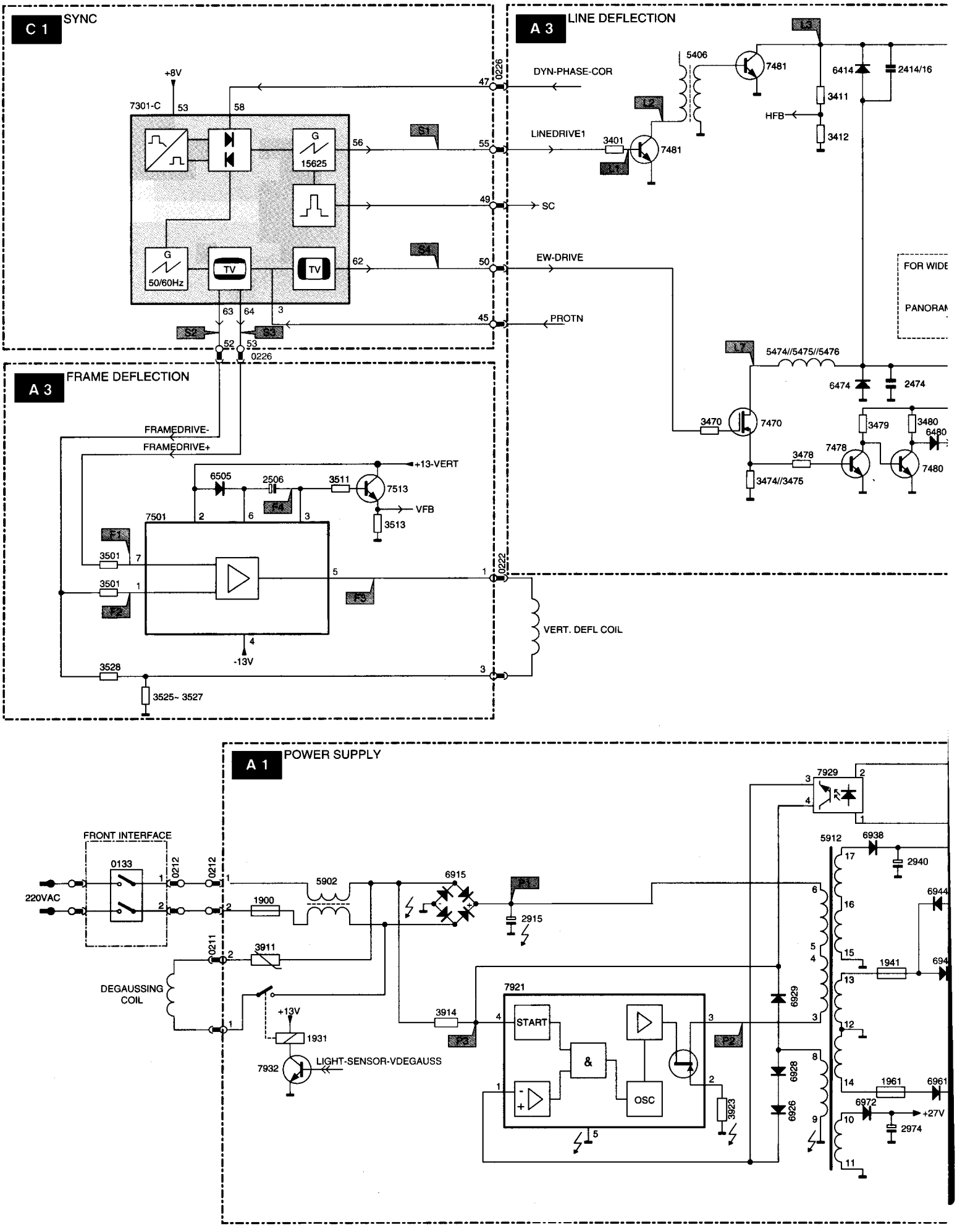
Blockdiagram

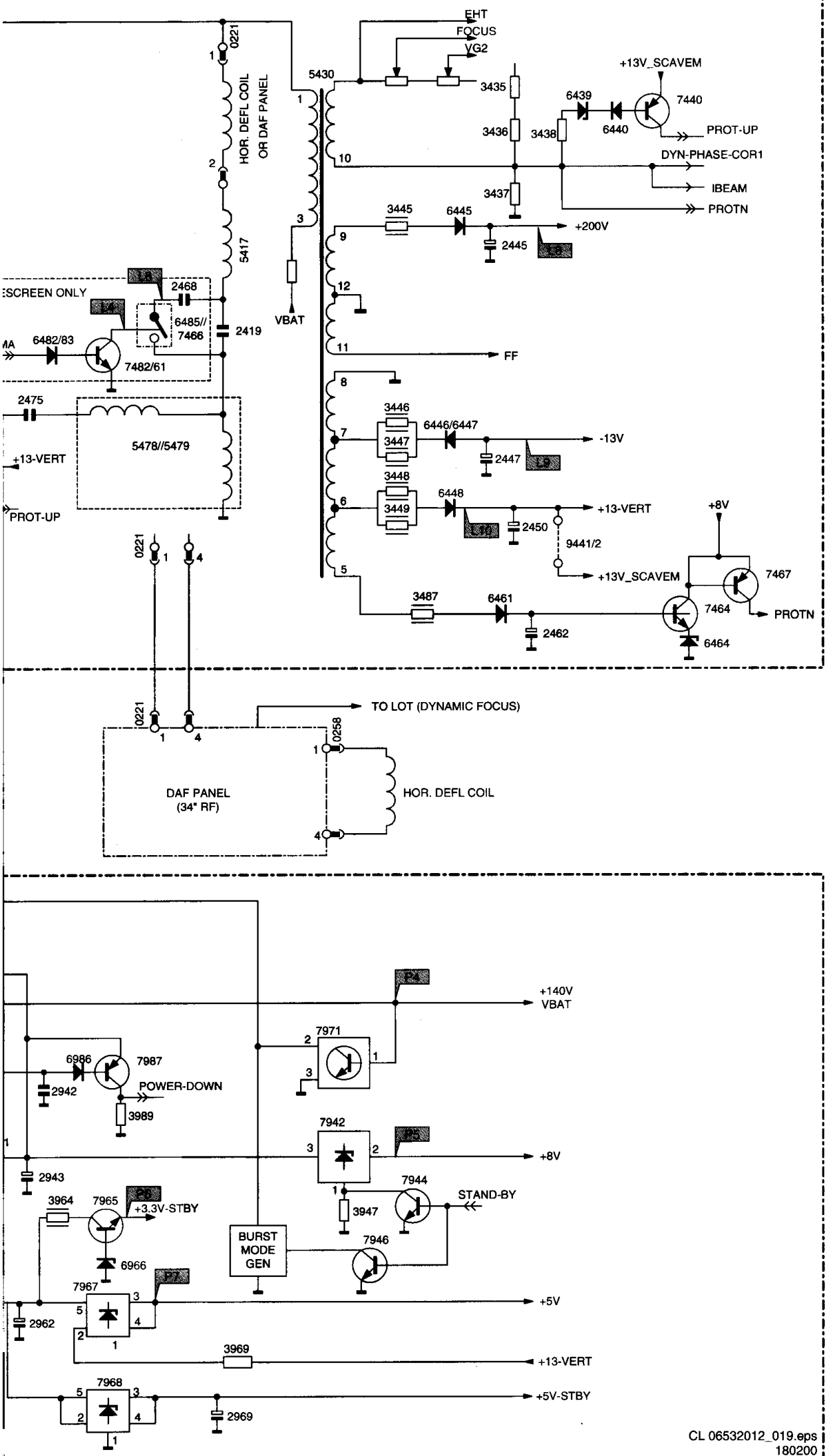




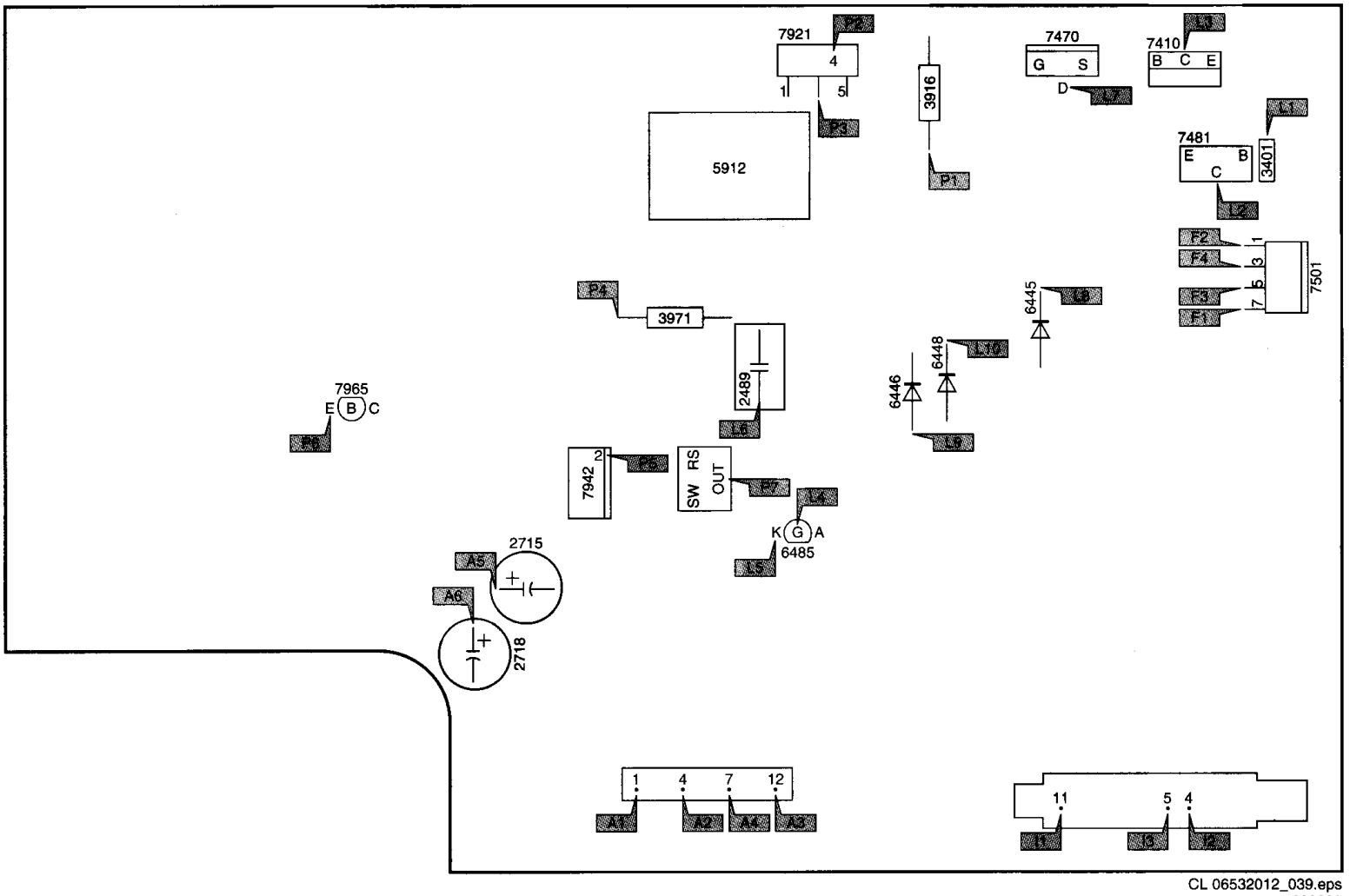
CL 06532012_018.eps
040200

Blockdiagram



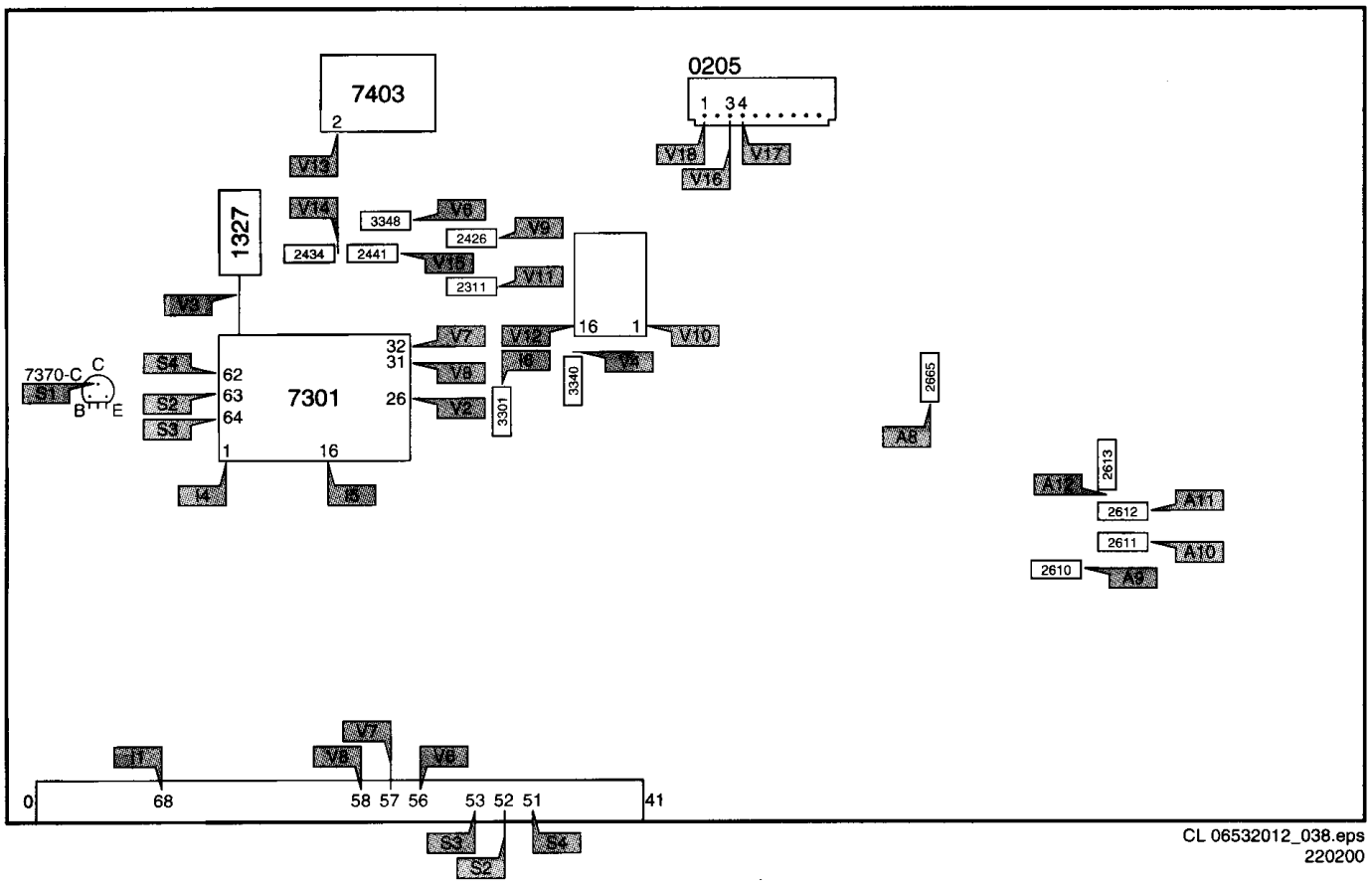

EHT
FOCUS
VG2
0221
HOR. DEFL COIL
OR DAF PANEL
5430
3435
3436
3438
3437
6439
6440
7440
+13V_SCAVEM
PROT-UP
DYN-PHASE-COR1
IBEAM
PROTN
3445
6445
+200V
2445
5417
2468
6485//
7466
2419
6482/83
7482/61
SCREEN ONLY
VBAT
FF
2475
5478//5479
+13-VERT
PROT-UP
3446
3447
6446/6447
-13V
2447
3448
3449
6448
+13-VERT
2450
9441/2
+8V
7467
+13V_SCAVEM
7464
PROTN
6464
3487
6461
2462
TO LOT (DYNAMIC FOCUS)
0258
DAF PANEL
(34" RF)
HOR. DEFL COIL
+140V
VBAT
7971
6986
7987
POWER-DOWN
2942
3989
7942
+8V
2943
3964
7965
+3.3V-STBY
6966
7944
STAND-BY
3947
BURST
MODE
GEN
7946
7967
+5V
2962
3969
+13-VERT
7968
+5V-STBY
2969
CL 06532012_019.eps
180200

Testpointoverview LSP (comp.side)



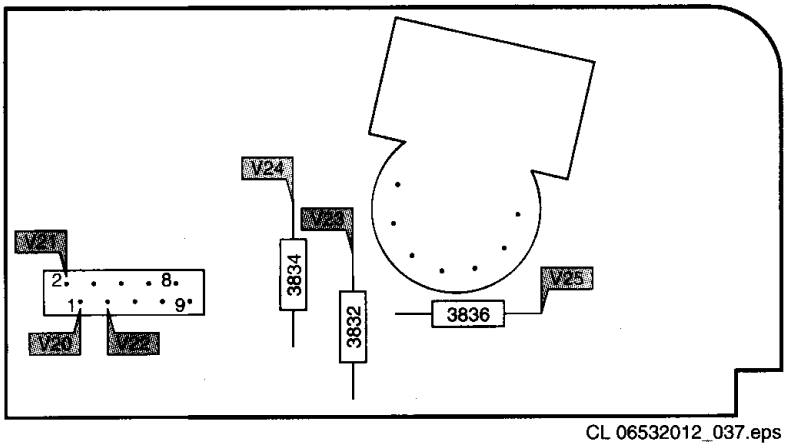
CL 06532012_039.eps
220200

Testpointoverview SSB (comp.side)



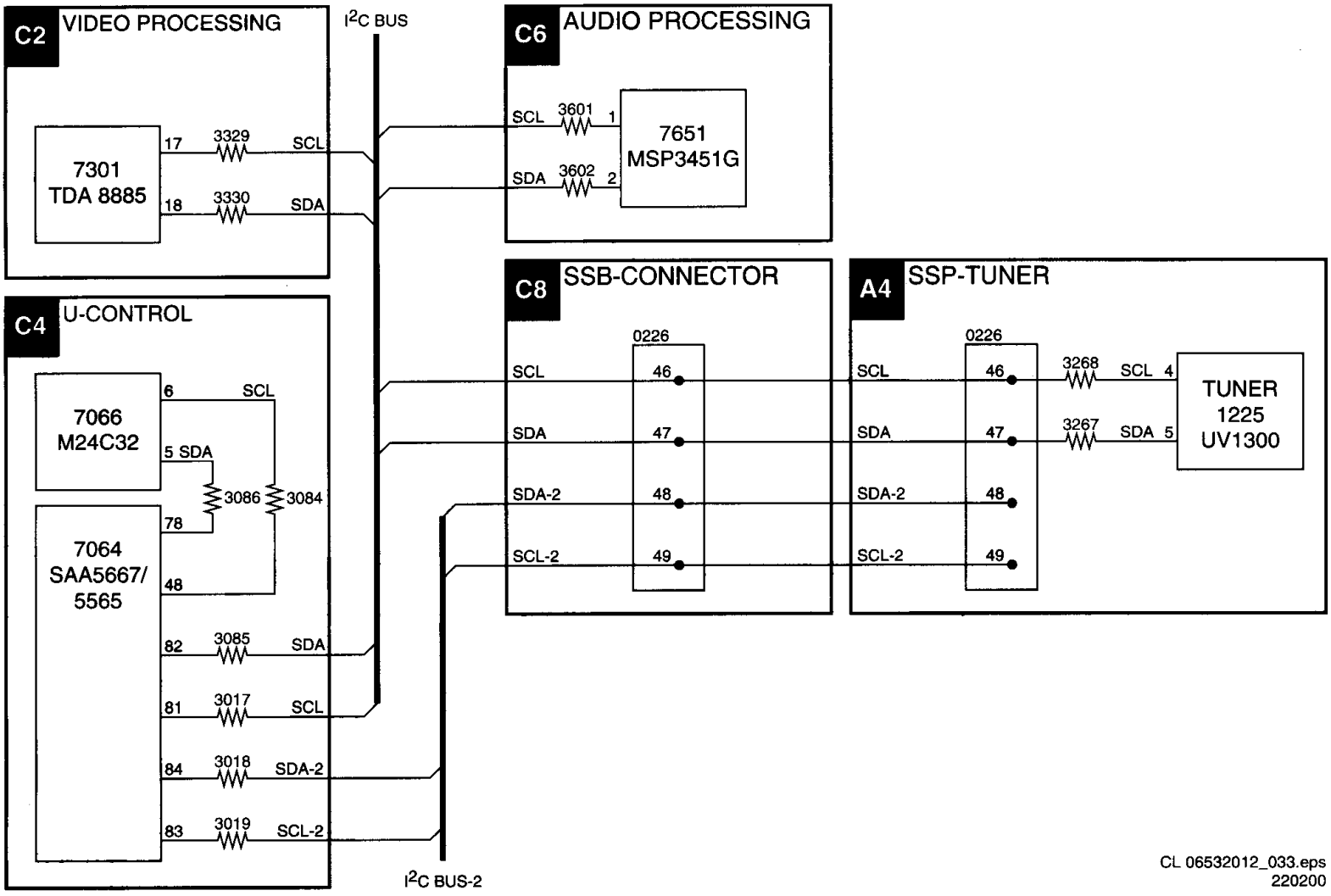
CL 06532012_038.eps
220200

Testpointoverview CRT (comp.side)



CL 06532012_037.eps
220200

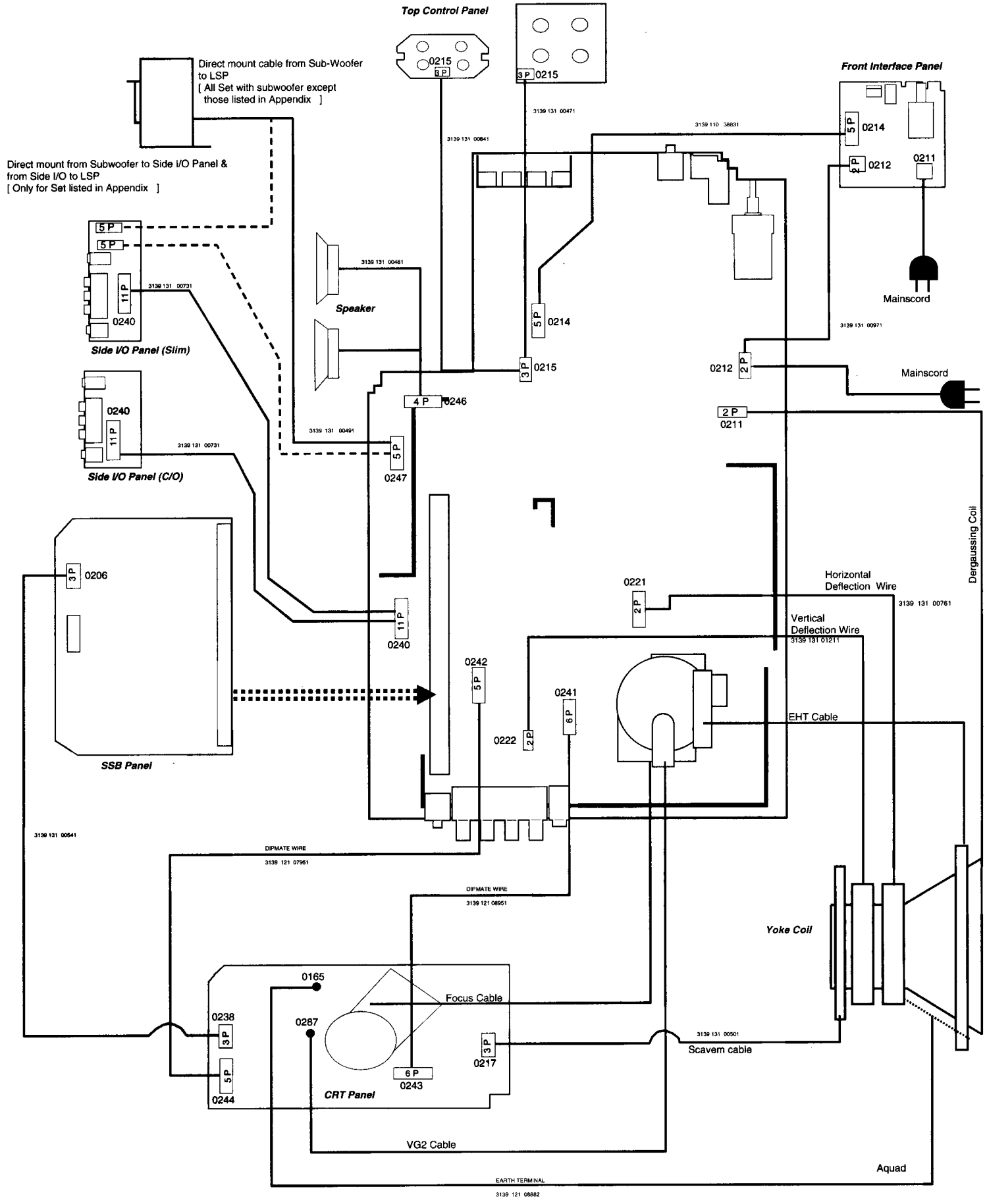
IC overview



CL 06532012_033.eps
220200

Wiringdiagram

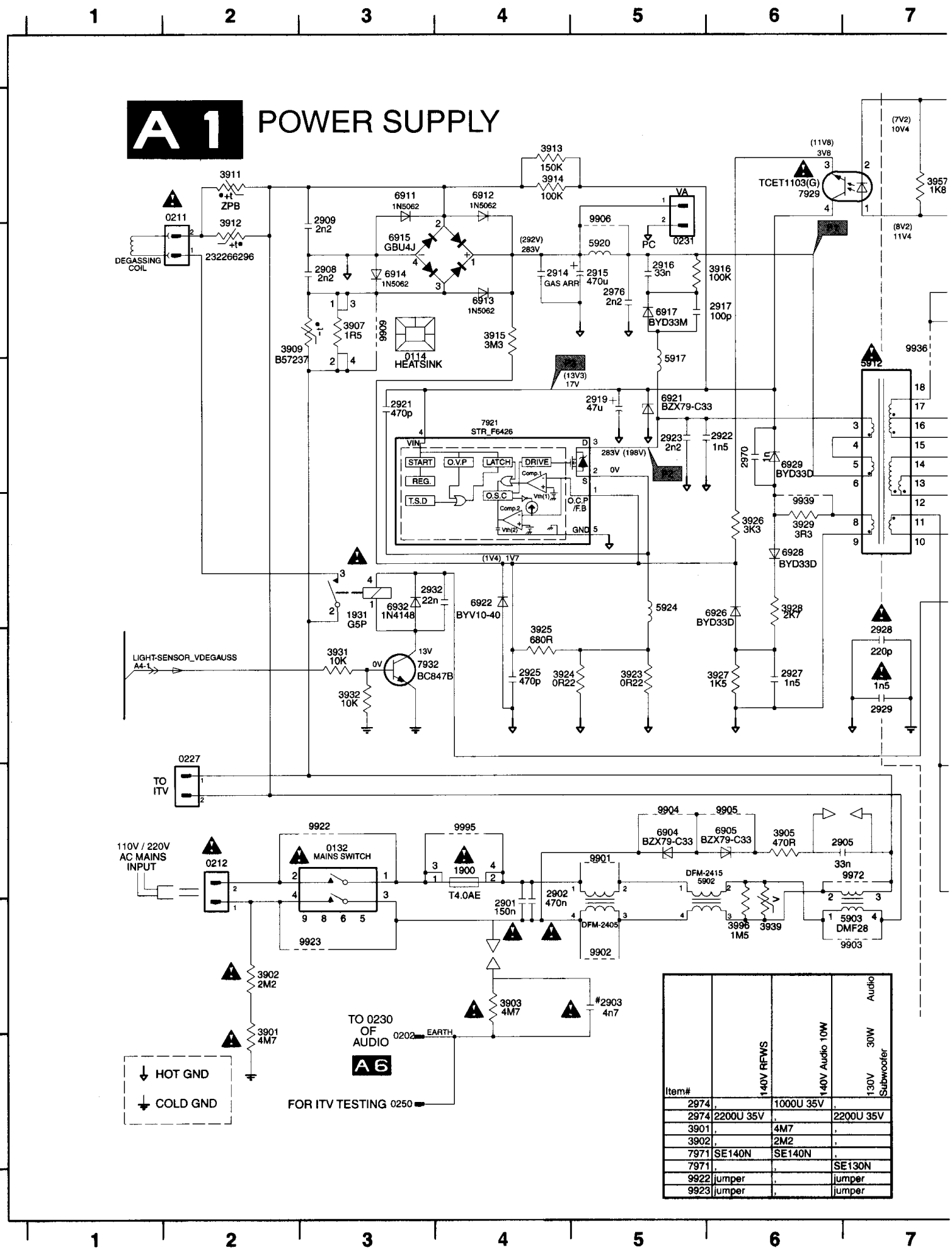
A10 - Wire Diagram (Basic Configuration)



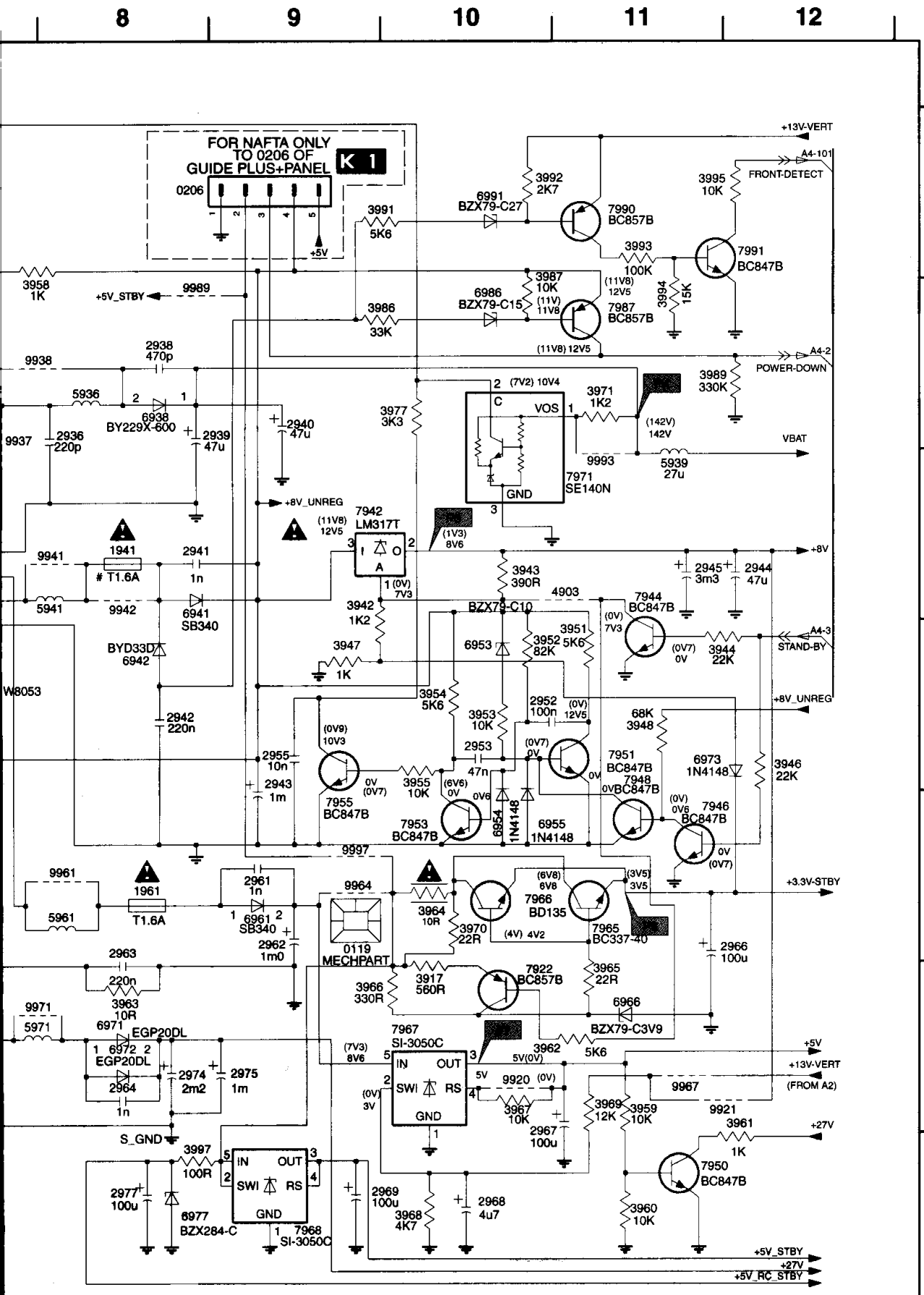
CL 06532012_017.eps
040200

7. Schematics and PWB's

Power supply

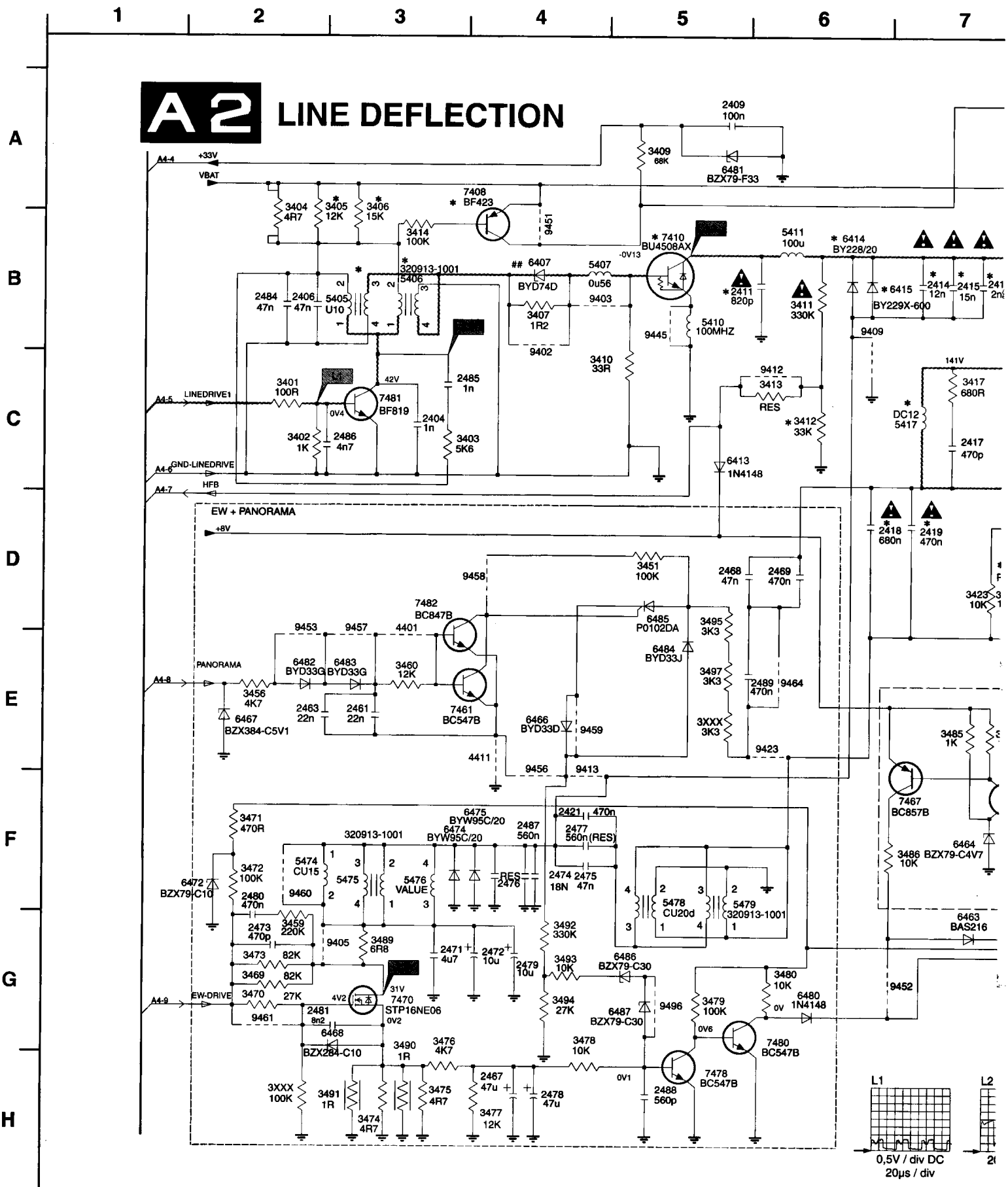


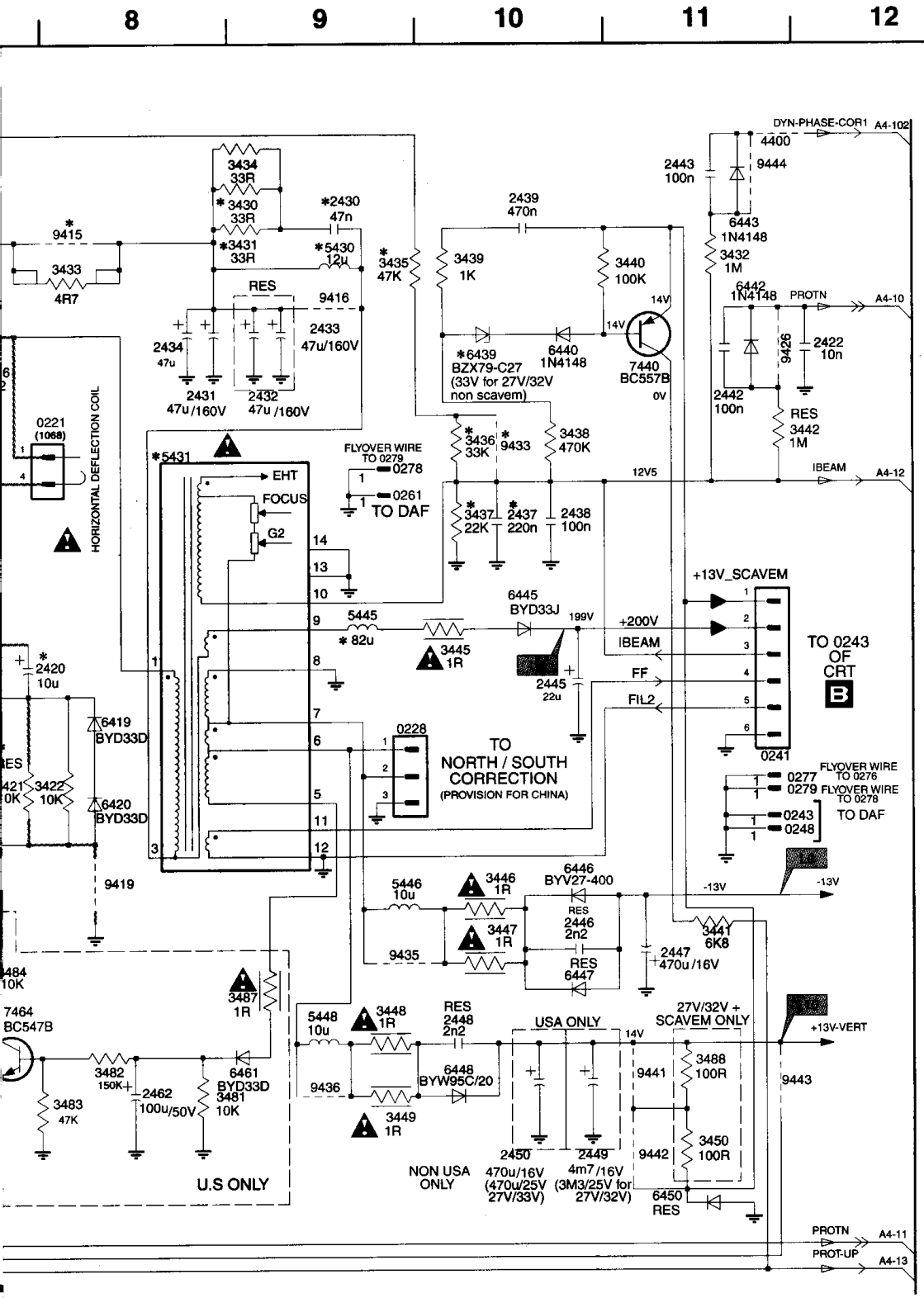
Item#	140V RFWS	140V Audio 10W	130V Audio 30W Subwoofer
2974	,	1000U 35V	,
2974	2200U 35V	,	2200U 35V
3901	,	4M7	,
3902	,	2M2	,
7971	SE140N	SE140N	,
7971	,	,	SE130N
9922	jumper	,	jumper
9923	jumper	,	jumper



0114 C3	3969 F11
0119 E9	3970 E10
0132 F3	3971 B11
0202 G3	3977 B10
0206 A8	3986 B10
0211 A2	3987 A10
0212 F2	3989 B11
0227 E2	3991 A10
0231 B5	3992 A10
0250 H3	3993 A11
1900 F4	3994 B11
1931 D3	3995 A11
1941 C8	3996 G6
1961 E8	3997 G8
2901 G4	4903 C11
2902 F4	5902 F5
2903 G5	5903 G7
2905 F6	5912 C7
2908 B3	5917 B5
2909 A3	5920 B5
2914 B4	5924 D5
2915 B5	5936 B8
2916 B5	5939 C11
2917 B6	5941 C8
2919 C5	5961 E8
2921 C3	5971 F7
2922 C6	6904 F5
2923 C5	6905 F6
2925 E4	6911 A3
2927 E6	6912 A4
2928 E7	6913 B4
2929 E7	6914 B3
2932 D3	6915 B3
2936 B8	6917 B5
2938 B8	6921 C5
2939 B9	6922 D4
2940 B9	6926 D6
2941 C8	6928 D6
2942 D8	6929 C6
2943 D9	6932 D3
2944 C12	6938 B8
2945 C11	6941 C8
2952 D10	6942 D8
2953 D10	6953 D10
2955 D9	6954 E10
2961 E9	6955 E10
2962 E9	6961 E9
2963 E8	6966 F11
2964 F8	6971 F8
2966 E12	6972 F8
2967 F10	6973 D11
2968 G10	6977 G8
2969 G10	6986 B10
2970 C6	6991 A10
2974 F8	7921 C4
2975 F9	7922 F11
2976 B5	7929 A6
2977 G8	7932 E3
3901 H2	7942 C9
3902 G2	7944 C11
3903 G4	7946 E12
3905 F6	7948 D11
3907 B3	7950 G11
3909 B2	7951 D11
3911 A2	7953 E10
3912 B2	7955 E9
3913 A4	7965 E11
3914 A4	7966 E10
3915 B4	7967 F10
3916 B6	7968 G9
3917 F10	7971 C11
3923 E5	7987 B11
3924 E4	7990 A11
3925 D4	7991 A12
3926 D6	9901 F5
3927 E6	9902 G5
3928 D6	9903 G7
3929 D6	9904 F5
3931 E3	9905 F6
3932 E3	9906 B5
3939 G6	9909 B3
3942 C9	9920 F10
3943 C10	9921 F11
3944 D11	9922 F3
3946 D12	9923 G3
3947 D9	9936 B7
3948 D11	9937 B7
3951 D11	9938 B8
3952 D10	9939 D6
3953 D10	9941 C8
3954 D10	9942 C8
3955 D10	9961 E8
3957 A7	9964 E9
3958 B7	9967 F11
3959 F11	9971 F8
3960 G11	9972 F7
3961 F12	9989 B8
3962 F10	9993 C11
3963 F8	9995 F4
3964 E10	9997 E9
3965 F11	
3966 F9	
3967 F10	
3968 G10	

Line deflection





0221 B7	3469 G2	9423 E6
0228 D9	3470 G2	9426 B11
0241 D11	3471 F2	9433 B10
0243 D12	3472 F2	9435 E9
0248 D12	3473 G2	9436 F9
0261 C10	3474 H3	9441 F11
0277 D12	3475 H3	9442 F11
0278 C10	3476 G3	9443 F12
0279 D12	3477 H4	9444 A11
2404 C3	3478 G4	9445 B5
2406 B2	3479 G5	9451 B4
2409 A5	3480 G6	9452 G7
2411 B5	3481 F9	9453 E2
2414 B7	3482 F8	9456 F4
2415 B7	3483 F8	9457 E3
2416 B7	3484 E7	9458 D4
2417 C7	3485 E7	9459 E4
2418 D6	3486 F7	9460 F2
2419 D7	3487 E9	9461 G2
2420 D8	3488 F11	9464 E6
2421 F4	3489 G3	9496 G5
2422 B12	3490 G3	
2430 A9	3491 H3	
2431 B8	3492 G4	
2432 B9	3493 G4	
2433 B9	3494 G4	
2434 B8	3495 D5	
2437 C10	3497 E5	
2438 C10	3XXX H2	
2439 A10	3XXX E5	
2442 B11	4400 A11	
2443 A11	4401 E3	
2445 D10	4411 E4	
2446 E10	5405 B3	
2447 E11	5406 B3	
2448 E10	5407 B4	
2449 F10	5410 B5	
2450 F10	5411 B6	
2461 E3	5417 C7	
2462 F8	5430 A9	
2463 E2	5431 B8	
2467 H4	5445 C9	
2468 D5	5446 E9	
2469 D6	5448 E9	
2471 G3	5474 F2	
2472 G4	5475 F3	
2473 G2	5476 F3	
2474 F4	5478 F5	
2475 F4	5479 F5	
2476 F4	6407 B4	
2477 F4	6413 C5	
2478 H4	6414 B6	
2479 G4	6415 B7	
2480 F2	6419 D8	
2481 G2	6420 D8	
2484 B2	6439 B10	
2485 C3	6440 B10	
2486 C3	6442 B11	
2487 F4	6443 A11	
2488 H5	6445 C10	
2489 E6	6446 E10	
3401 C2	6447 E10	
3402 C2	6448 F10	
3403 C3	6450 F11	
3404 A2	6461 F9	
3405 A3	6463 F7	
3406 A3	6464 F7	
3407 B4	6466 E4	
3409 A5	6467 E2	
3410 C4	6468 G3	
3411 B6	6472 F2	
3412 C6	6474 F3	
3413 C6	6475 F4	
3414 B3	6480 G6	
3417 C7	6481 A5	
3421 D7	6482 E2	
3422 D8	6483 E3	
3423 D7	6484 E5	
3430 A9	6485 D5	
3431 A9	6486 G5	
3432 A11	6487 G5	
3433 A8	7408 A3	
3434 A9	7410 B5	
3435 A9	7440 B11	
3436 B10	7461 E3	
3437 C10	7464 E7	
3438 B10	7467 F7	
3439 A10	7470 G3	
3440 A11	7478 H5	
3441 E11	7480 G6	
3442 B12	7481 C3	
3445 D10	7482 D3	
3446 E10	9402 C4	
3447 E10	9403 B4	
3448 E9	9405 G3	
3449 F9	9409 B6	
3450 F11	9412 C6	
3451 D5	9413 F4	
3456 E2	9415 A8	
3459 G2	9416 B9	
3460 E3	9419 E8	

Diversity table diagram A2

Item #	28" BLD WS	32" BLS WS	32" RF WS	24" BLD WS	32" BLS WSThomson	28" BLS WSThomson	29" RF
2271	,	,	,	,	,	,	50V / 1U
2411	,	,	,	1N 2KV	,	,	,
2411	,	,	,	,	,	1N2 2KV	,
2411	1N5 2KV	1N5 2KV	1N5 2KV	,	1N5 2KV	,	,
2411	,	,	,	,	,	,	1N8 2KV
2416	,	,	820P 2KV	,	,	,	,
2416	,	1N 2KV	,	,	,	,	,
2416	1N2 2KV	,	,	,	,	,	,
2416	,	,	,	,	,	,	1N5 2KV
2416	,	,	,	,	1N8 2KV	1N8 2KV	,
2416	,	,	,	2N2 2KV	,	,	,
2419	,	,	,	,	,	,	360N 250V
2419	,	,	430N 250V	,	,	,	,
2419	,	,	,	,	,	,	,
2419	680N 2KV	,	,	680N 2KV	,	680N 2KV	,
2419	,	820N 2KV	,	,	820N 2KV	,	,
2420	4U7 2KV	,	,	,	,	4U7 2KV	,
2420	,	2U2 160V	2U2 160V	2U2 160V	2U2 160V	,	2U2 160V
2430	,	27N 50V	27N 50V	,	27N 50V	27N 50V	,
2430	10N 50V	,	,	10N 50V	,	,	,
2430	,	,	,	,	,	,	15N 50V
2437	,	,	,	100N 250V	,	100N 250V	,
2437	150N 250V	,	150N 250V	,	,	,	,
2437	,	220N 250V	,	,	220N 250V	,	220N 250V
2449	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	,
2449	,	,	,	,	,	,	470U 25V
2474	,	,	,	,	,	,	27N 400V
2474	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	,	7N5 1K6V	,
2474	,	,	,	,	9N1 1K6V	,	,
2477	430N 250V	430N 250V	430N 250V	430N 250V	,	430N 250V	,
2477	,	,	,	,	470N 250V	,	,
2487	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	,	7N5 1K6V	,
2487	,	,	,	,	9N1 1K6V	,	,
3272	,	,	,	,	,	,	100K
3403	3K3	3K3	3K3	3K3	3K3	3K3	,
3403	,	,	,	,	,	,	5K6
3405	4K7	,	4K7	4K7	,	,	4K7
3405	,	5K6	,	,	5K6	5K6	,
3430	,	,	,	,	,	,	15R
3430	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	,
3435	,	27K	,	,	27K	,	,
3435	,	,	39K	,	,	39K	39K
3435	47K ,	,	,	47K ,	,	,	,
3436	,	,	,	,	,	39K	39K
3436	,	,	47K	,	,	,	,
3436	,	56K	,	,	56K	,	,
3436	68K	,	,	68K	,	,	,

CL 06532012_058.eps
140300

1 2 3

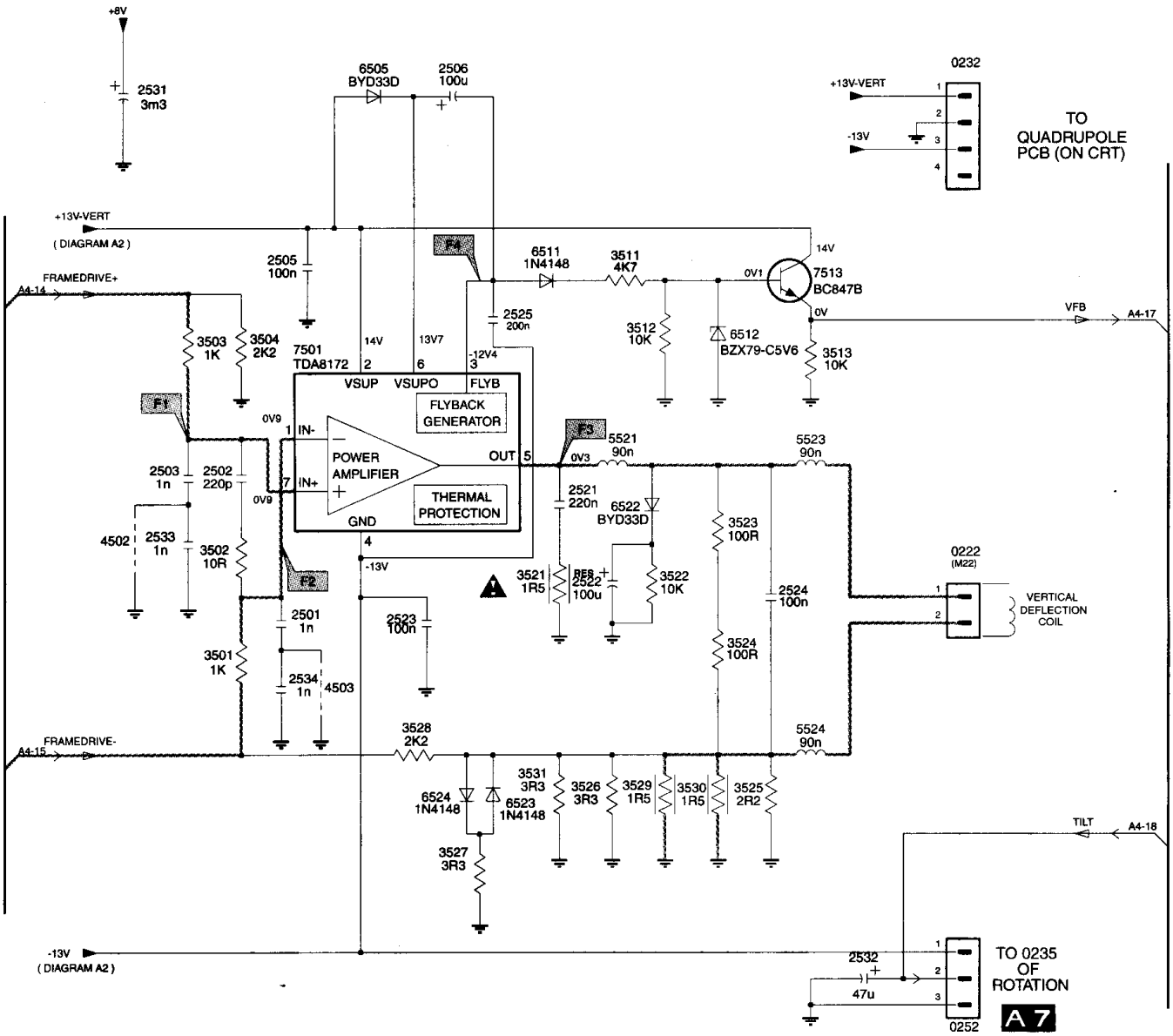
A B C D E F G H

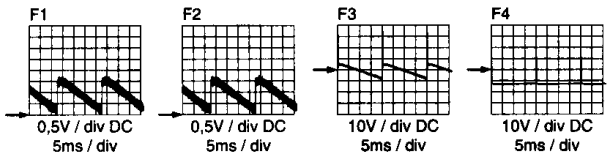
A3 FRAME DEFLEC

Item #	28" BLD WS	32" BLS WS	32" RF WS	24" BLD WS	32" BLS WSThomson	28" BLS WSThomson	29" RF
2271	,	,	,	,	,	,	50V / 1U
2411	,	,	,	1N 2KV	,	,	,
2411	,	,	,	,	,	1N2 2KV	,
2411	1N5 2KV	1N5 2KV	1N5 2KV	,	1N5 2KV	,	,
2411	,	,	,	,	,	,	1N8 2KV
2416	,	,	820P 2KV	,	,	,	,
2416	,	1N 2KV	,	,	,	,	,
2416	1N2 2KV	,	,	,	,	,	,
2416	,	,	,	,	,	,	1N5 2KV
2416	,	,	,	,	1N8 2KV	1N8 2KV	,
2416	,	,	,	2N2 2KV	,	,	,
2419	,	,	,	,	,	,	360N 250V
2419	,	,	430N 250V	,	,	,	,
2419	,	,	,	,	,	,	,
2419	680N 2KV	,	,	680N 2KV	,	680N 2KV	,
2419	,	820N 2KV	,	,	820N 2KV	,	,
2420	4U7 2KV	,	,	,	,	4U7 2KV	,
2420	,	2U2 160V	2U2 160V	2U2 160V	2U2 160V	,	2U2 160V
2430	,	27N 50V	27N 50V	,	27N 50V	27N 50V	,
2430	10N 50V	,	,	10N 50V	,	,	,
2430	,	,	,	,	,	,	15N 50V
2437	,	,	,	100N 250V	,	100N 250V	,
2437	150N 250V	,	150N 250V	,	,	,	,
2437	,	220N 250V	,	,	220N 250V	,	220N 250V
2449	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	,
2449	,	,	,	,	,	,	470U 25V
2474	,	,	,	,	,	,	27N 400V
2474	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	,	7N5 1K6V	,
2474	,	,	,	,	9N1 1K6V	,	,
2477	430N 250V	430N 250V	430N 250V	430N 250V	,	430N 250V	,
2477	,	,	,	,	470N 250V	,	,
2487	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	,	7N5 1K6V	,
2487	,	,	,	,	9N1 1K6V	,	,
3272	,	,	,	,	,	,	100K
3403	3K3	3K3	3K3	3K3	3K3	3K3	,
3403	,	,	,	,	,	,	5K6
3405	4K7	,	4K7	4K7	,	,	4K7
3405	,	5K6	,	,	5K6	5K6	,
3430	,	,	,	,	,	,	15R
3430	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	,
3435	,	27K	,	,	27K	,	,
3435	,	,	39K	,	,	39K	39K
3435	47K ,	,	,	47K ,	,	,	,
3436	,	,	,	,	,	39K	39K
3436	,	,	47K	,	,	,	,
3436	,	56K	,	,	56K	,	,
3436	68K	,	,	68K	,	,	,

1 2 3

CTION

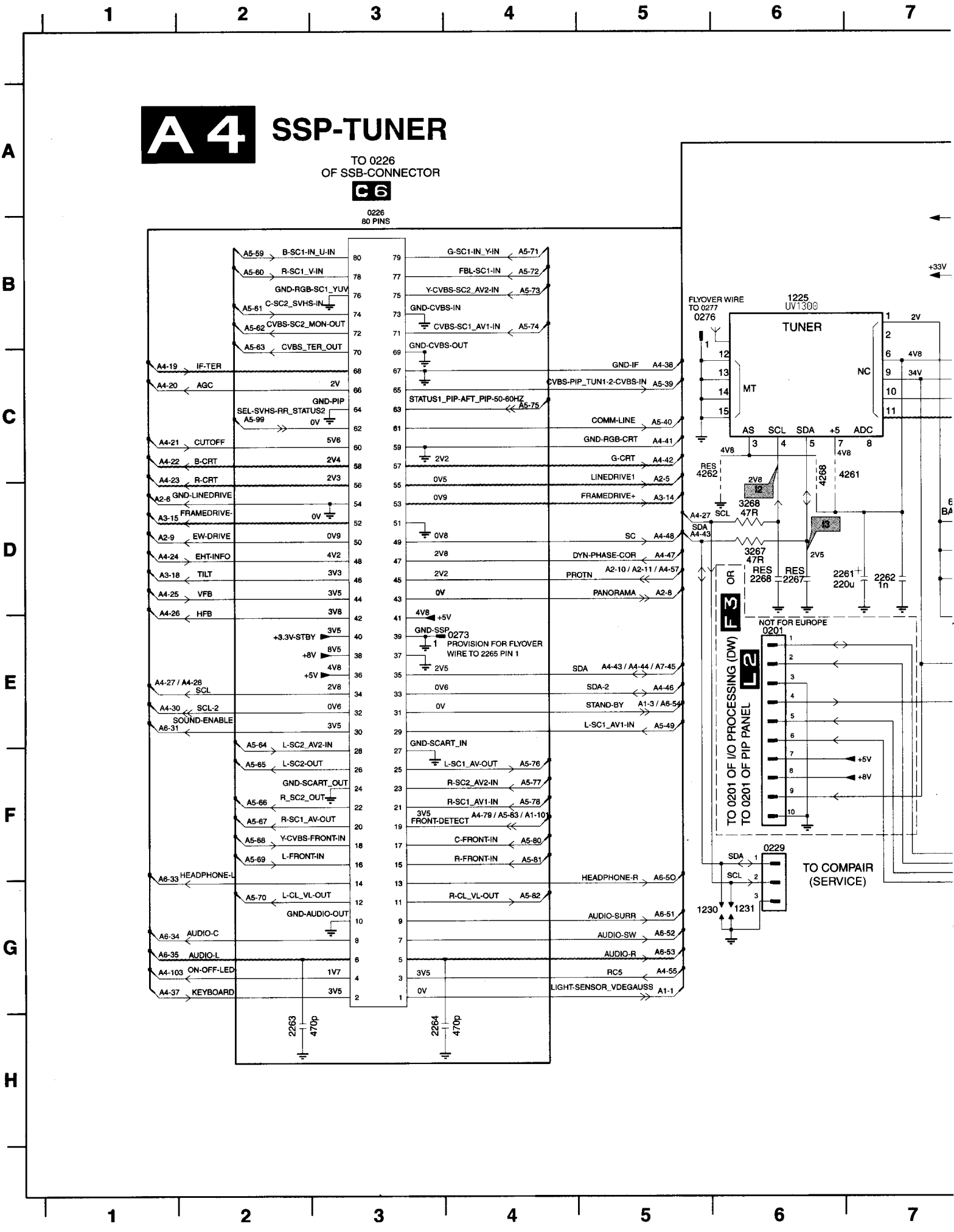


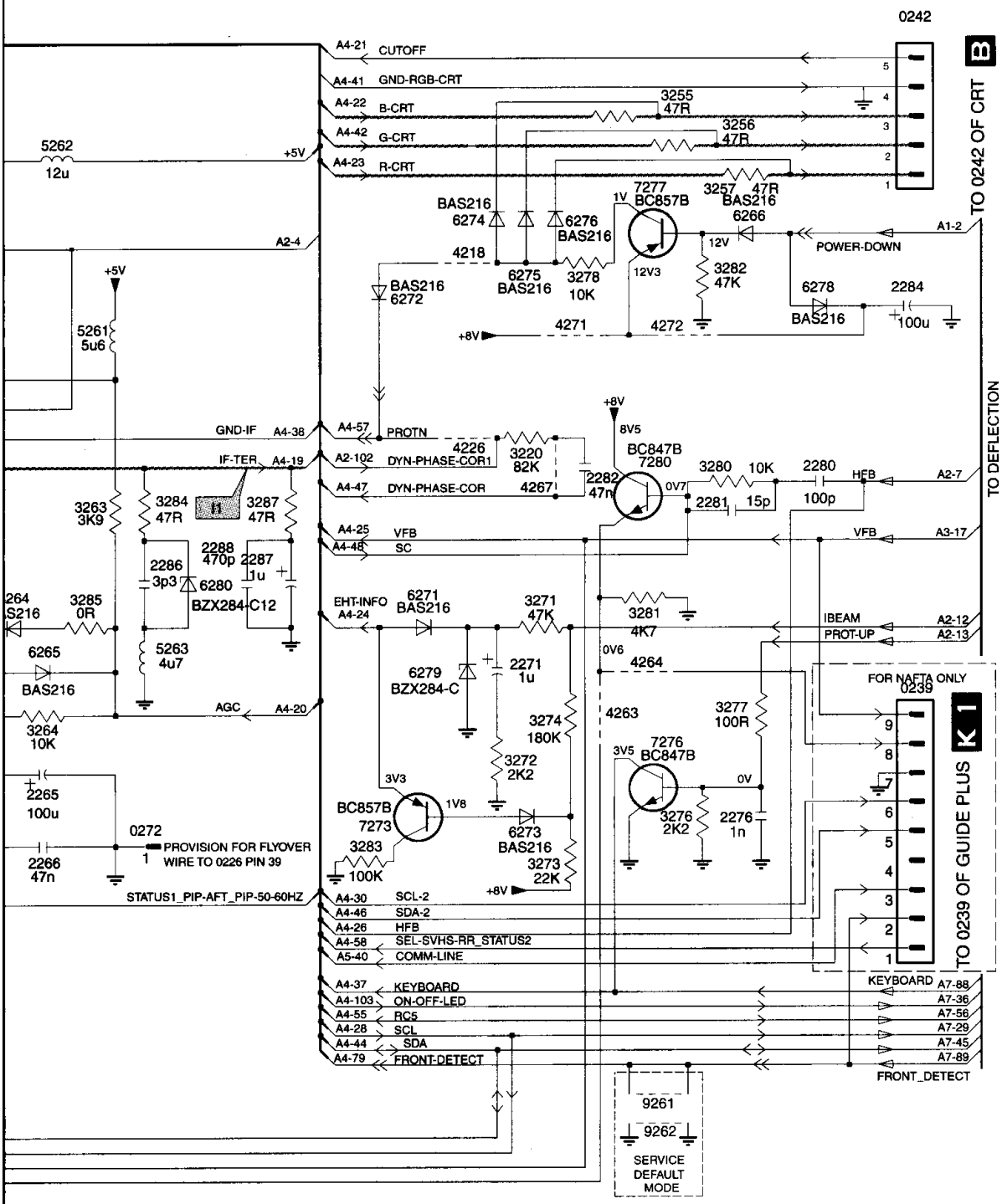


CL 06532012_052.eps
140300

0222 D9
0232 B9
0252 G9
2501 E6
2502 D5
2503 D5
2505 C6
2506 B6
2521 D7
2522 D7
2523 E6
2524 E8
2525 C7
2531 B4
2532 F9
2533 D5
2534 E6
3501 E5
3502 D5
3503 C5
3504 C5
3511 C7
3512 C8
3513 C9
3521 D7
3522 D8
3523 D8
3524 E8
3525 F8
3526 F7
3527 F7
3528 E7
3529 F7
3530 F8
4502 D5
4503 E6
5521 D7
5523 D8
5524 E8
6505 B6
6511 C7
6512 C8
6522 D7
7501 C6
7513 C8

SSP-Tuner

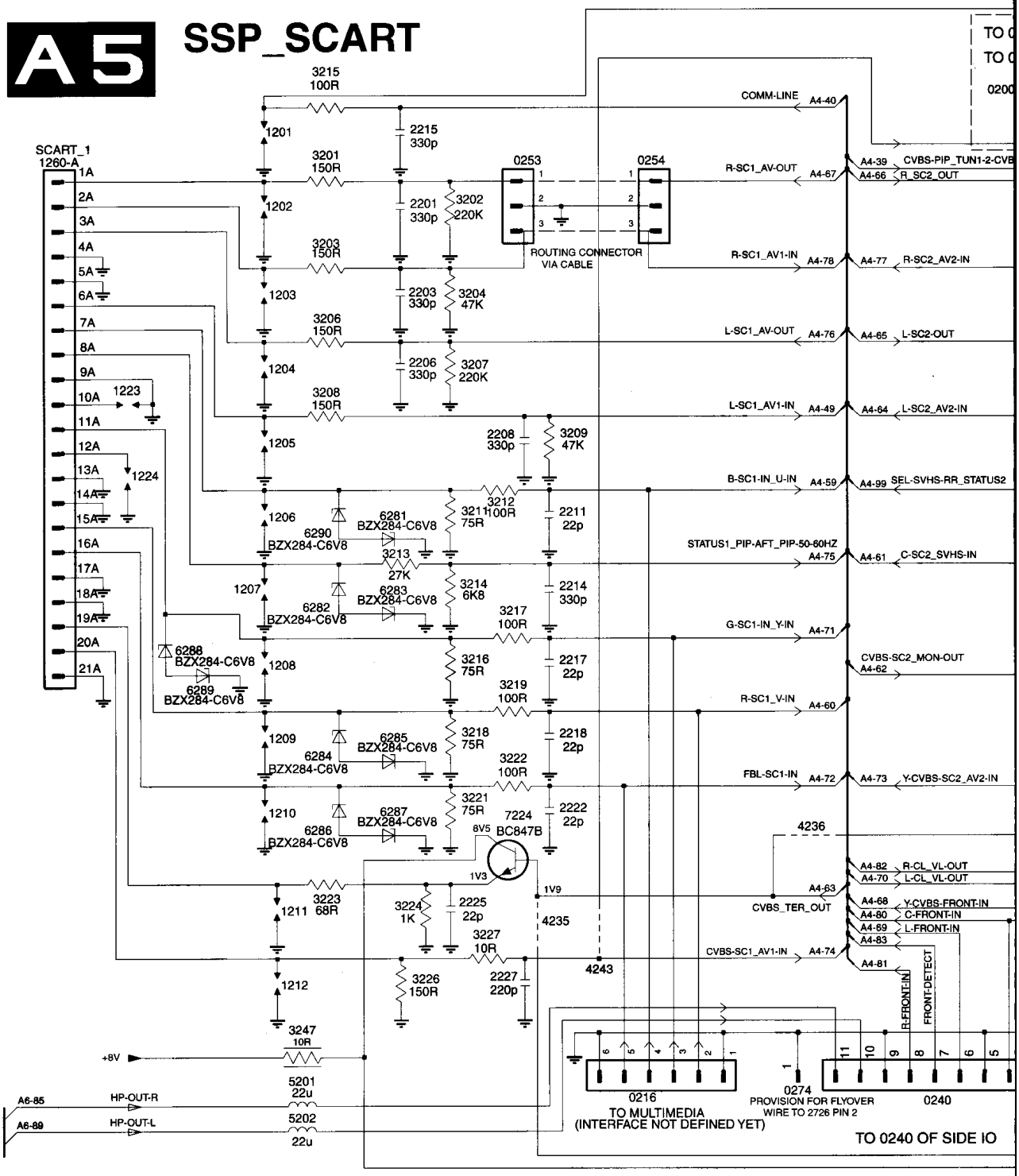

A 4 SSP-TUNER
TO 0226
OF SSB-CONNECTOR
C 6
0226
80 PINS
TUNER
1225
UV1300
FLYOVER WIRE
TO 0277
0276
NOT FOR EUROPE
0201
TO 0201 OF I/O PROCESSING (DW)
TO 0201 OF PIP PANEL
TO COMPAIR
(SERVICE)
0229
0273
PROVISION FOR FLYOVER
WIRE TO 2265 PIN 1
B-SC1-IN_U-IN
R-SC1_V-IN
GND-RGB-SC1_YUV
C-SC2_SVHS-IN
CVBS-SC2_MON-OUT
CVBS_TER_OUT
IF-TER
AGC
GND-PIP
SEL-SVHS-RR_STATUS2
CUTOFF
B-CRT
R-CRT
GND-LINEDRIVE
FRAMEDRIVE-
EW-DRIVE
EHT-INFO
TILT
VFB
HFB
+3.3V-STBY
+8V
+5V
SCL
SCL-2
SOUND-ENABLE
L-SC2_AV2-IN
L-SC2-OUT
GND-SCART_OUT
R_SC2_OUT
R-SC1_AV-OUT
Y-CVBS-FRONT-IN
L-FRONT-IN
HEADPHONE-L
L-CL_VL-OUT
GND-AUDIO-OUT
AUDIO-C
AUDIO-L
ON-OFF-LED
KEYBOARD
G-SC1-IN_Y-IN
FBL-SC1-IN
Y-CVBS-SC2_AV2-IN
GND-CVBS-IN
CVBS-SC1_AV1-IN
GND-CVBS-OUT
STATUS1_PIP-AFT_PIP-50-60HZ
GND-SSP
SDA
SDA-2
STAND-BY
L-SC1_AV1-IN
GND-SCART_IN
L-SC1_AV-OUT
R-SC2_AV2-IN
R-SC1_AV1-IN
FRONT-DETECT
C-FRONT-IN
R-FRONT-IN
HEADPHONE-R
R-CL_VL-OUT
AUDIO-SURR
AUDIO-SW
AUDIO-R
RC5
LIGHT-SENSOR_VDEGAUSS
GND-IF
CVBS-PIP_TUN1-2-CVBS-IN
COMM-LINE
GND-RGB-CRT
G-CRT
LINEDRIVE1
FRAMEDRIVE+
SC
DYN-PHASE-COR
PROTN
PANORAMA
2263
470p
2264
470p
3268
47R
3267
47R
4262
4268
4261
2261
220u
2262
1n

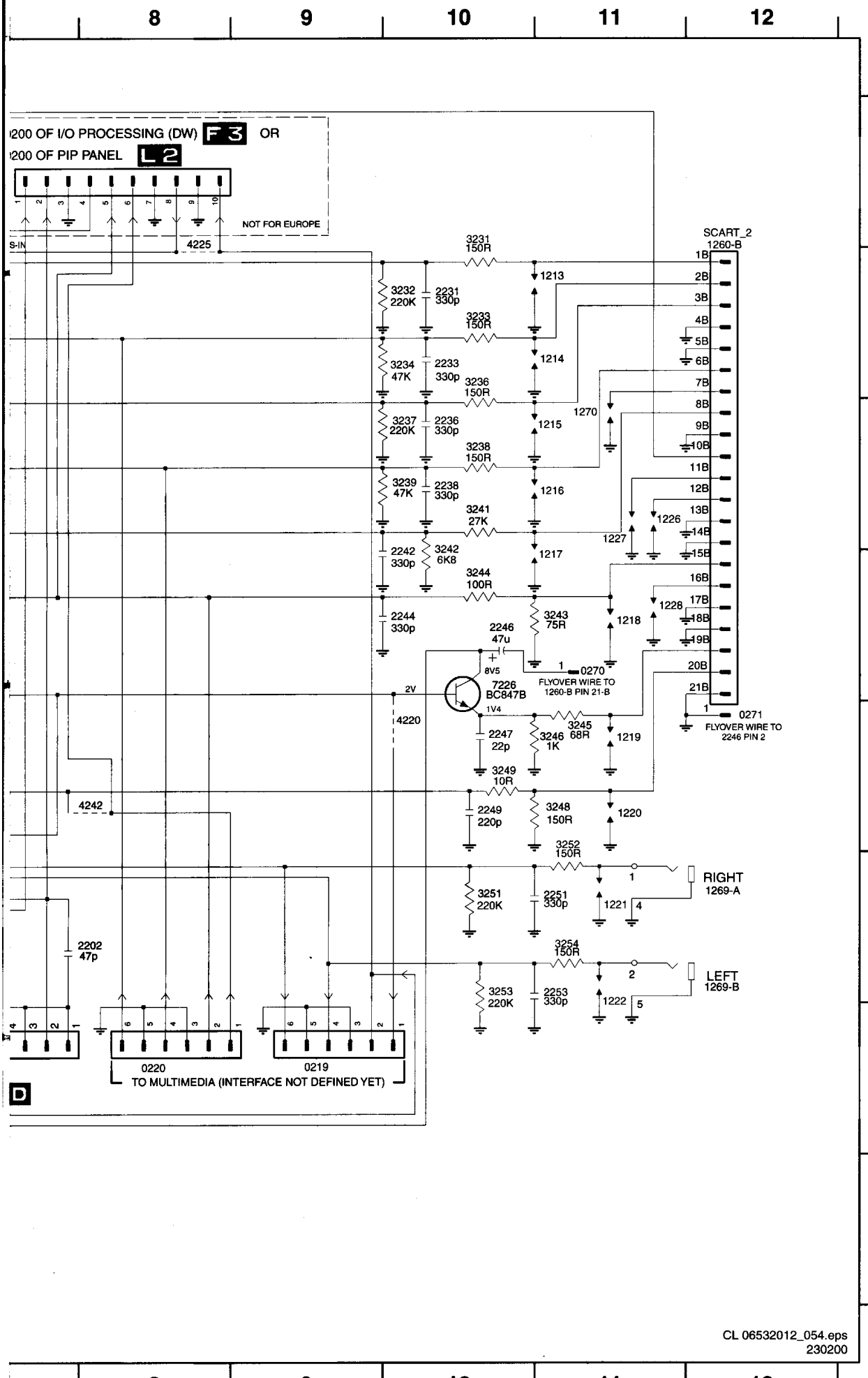


CL 06532012_053.eps
030300

0201 E6
0226 A3
0229 F6
0239 D12
0242 A12
0272 E8
0273 E4
0276 B5
1225 B6
1230 G5
1231 G6
2261 D6
2262 D7
2263 H2
2264 H3
2265 E7
2266 E8
2267 D6
2268 D6
2271 D10
2276 E11
2280 C11
2281 C11
2282 C10
2284 B12
2286 C8
2287 C9
3220 C10
3255 A11
3256 A11
3257 B11
3263 C8
3264 D7
3267 D6
3268 D6
3271 D10
3272 D10
3273 E10
3274 D10
3276 E11
3277 D11
3278 B10
3280 C11
3281 D10
3282 B11
3283 E9
3284 C8
3285 D8
3287 C9
4218 B10
4226 C10
4261 C7
4262 C5
4263 D10
4264 D10
4267 C10
4268 C6
4271 B10
4272 B11
5261 B8
5262 A8
5263 D8
6264 D7
6265 D8
6266 B11
6271 D9
6272 B9
6273 E10
6274 B10
6275 B10
6276 B10
6278 B11
6279 D9
6280 D8
7273 E9
7276 D11
7277 B11
7280 C11
9261 F10
9262 F11

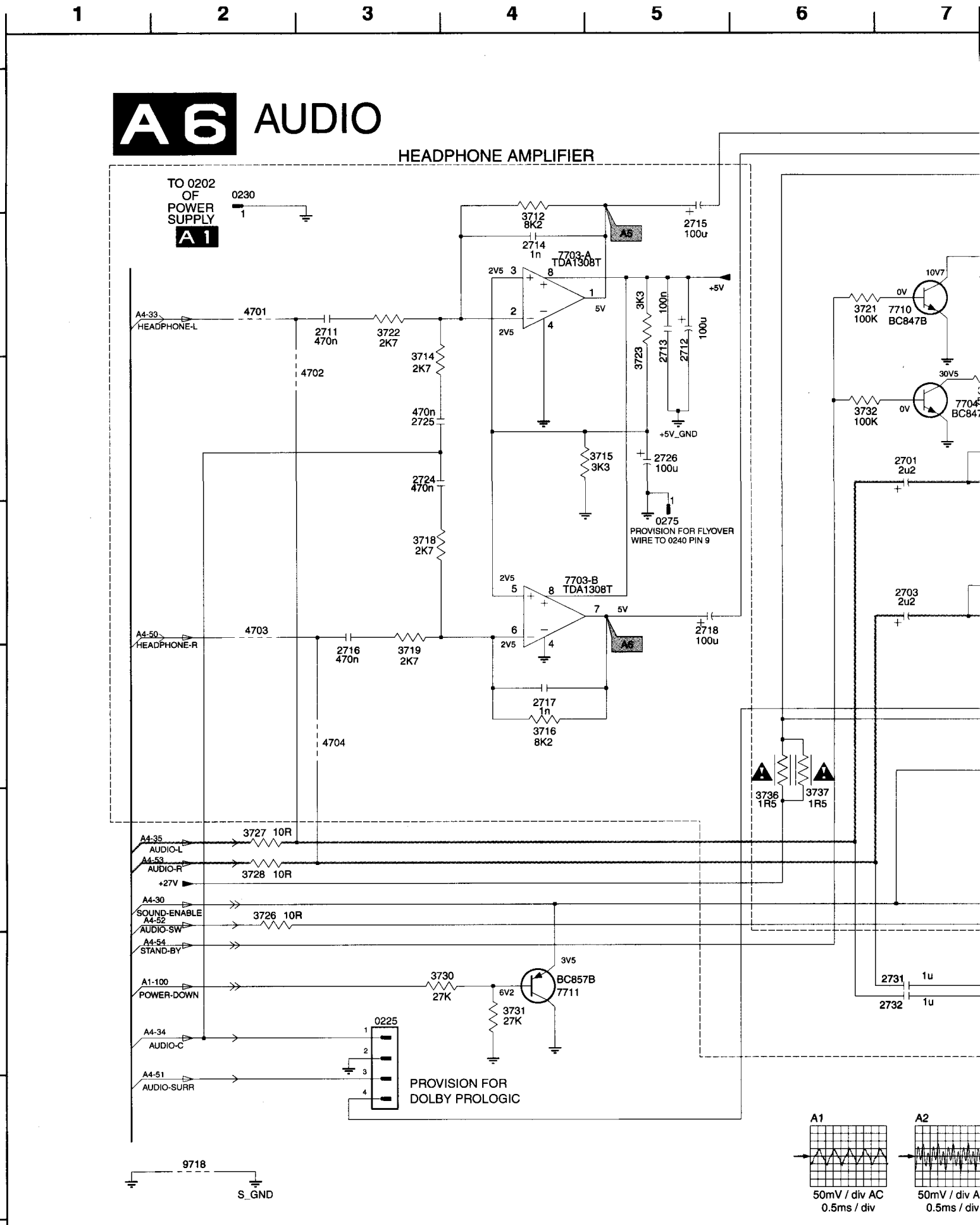
SSP-SCART

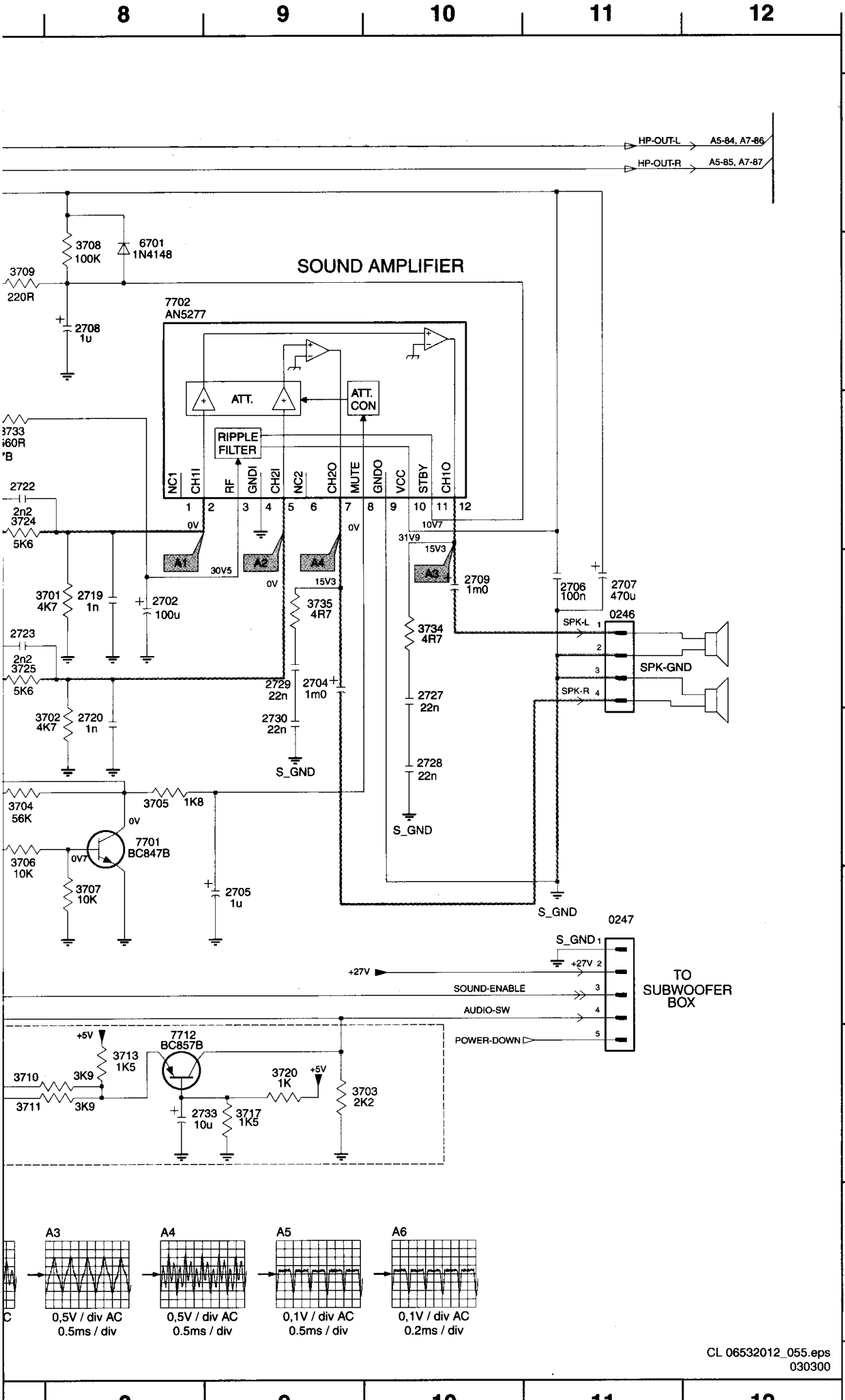

A5
SSP_SCART
SCART_1
1260-A
3215 100R
2215 330p
3201 150R
2201 330p
3202 220K
3203 150R
2203 330p
3204 47K
3206 150R
2206 330p
3207 220K
3208 150R
2208 330p
3209 47K
3212 100R
3211 75R
2211 22p
3213 27K
3214 6K8
2214 330p
3217 100R
3216 75R
2217 22p
3219 100R
3218 75R
2218 22p
3222 100R
3221 75R
2222 22p
3223 68R
3224 1K
2225 22p
3227 10R
3226 150R
2227 220p
3247 10R
5201 22u
5202 22u
6281 BZX284-C6V8
6290 BZX284-C6V8
6283 BZX284-C6V8
6282 BZX284-C6V8
6285 BZX284-C6V8
6284 BZX284-C6V8
6287 BZX284-C6V8
6286 BZX284-C6V8
6288 BZX284-C6V8
6289 BZX284-C6V8
7224 BC847B
8V5
1V3
1V9
4235
4236
4243
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1223
1224
0253
0254
ROUTING CONNECTOR VIA CABLE
0216
TO MULTIMEDIA (INTERFACE NOT DEFINED YET)
0274
PROVISION FOR FLYOVER WIRE TO 2726 PIN 2
0240
TO 0240 OF SIDE IO
COMM-LINE A4-40
R-SC1_AV-OUT A4-67
A4-39 CVBS-PIP_TUN1-2-CVB
A4-66 R_SC2_OUT
R-SC1_AV1-IN A4-78
A4-77 R-SC2_AV2-IN
L-SC1_AV-OUT A4-76
A4-65 L-SC2-OUT
L-SC1_AV1-IN A4-49
A4-64 L-SC2_AV2-IN
B-SC1-IN_U-IN A4-59
A4-99 SEL-SVHS-RR_STATUS2
STATUS1_PIP-AFT_PIP-50-60HZ A4-75
A4-61 C-SC2_SVHS-IN
G-SC1-IN_Y-IN A4-71
CVBS-SC2_MON-OUT A4-62
R-SC1_V-IN A4-60
FBL-SC1-IN A4-72
A4-73 Y-CVBS-SC2_AV2-IN
CVBS_TER_OUT A4-63
A4-82 R-CL_VL-OUT
A4-70 L-CL_VL-OUT
A4-68 Y-CVBS-FRONT-IN
A4-80 C-FRONT-IN
A4-69 L-FRONT-IN
A4-83
A4-81
CVBS-SC1_AV1-IN A4-74
R-FRONT-IN
FRONT-DETECT
+8V
A6-85 HP-OUT-R
A6-89 HP-OUT-L



0200 A7
0216 G5
0219 G9
0220 G8
0240 G7
0253 B4
0254 B5
0270 D11
0271 E12
0274 G6
1201 A3
1202 B3
1203 B3
1204 C3
1205 C3
1206 D3
1207 D3
1208 D3
1209 E3
1210 E3
1211 F3
1212 F3
1213 B11
1214 B11
1215 C11
1216 C11
1217 D11
1218 D11
1219 E11
1220 E11
1221 F11
1222 G11
1223 C2
1224 C2
1226 C11
1227 C11
1228 D11
1260-A B2
1260-B B12
1269-A F12
1269-B F12
1270 C11
2201 B4
2202 F8
2203 B4
2206 C4
2208 C4
2211 D4
2214 D4
2215 A4
2217 D4
2218 E4
2222 E4
2225 F4
2227 F4
2231 B10
2233 B10
2236 C10
2238 C10
2242 D10
2244 D10
2246 D10
2247 E10
2249 E10
2251 F11
2253 F11
3201 A3
3202 B4
3203 B3
3204 B4
3206 B3
3207 C4
3208 C3
3209 C4
3211 D4
3212 C4
3213 D3
3214 D4
3215 A3
3216 D4
3217 D4
3218 E4
3219 E4
3221 E4
3222 E4
3223 F3
3224 F4
3226 F4
3227 F4
3231 A10
3232 B10
3233 B10
3234 B10
3236 B10
3237 C10
3238 C10
3239 C10
3241 C10
3242 D10
3243 D11
3244 D10
3245 E11
3246 E11
3247 G3
3248 E11
3249 E10
3251 F10
3252 E11
3253 F10
3254 F11
4220 E10
4225 B8
4235 F4
4236 E6
4242 E8
4243 F5
5201 G3
5202 G3
6280 D3
6281 D3
6282 D3
6283 D3
6284 E3
6285 E3
6286 E3
6287 E3
6288 D2
6289 E2
7224 E4
7226 D10

Audio

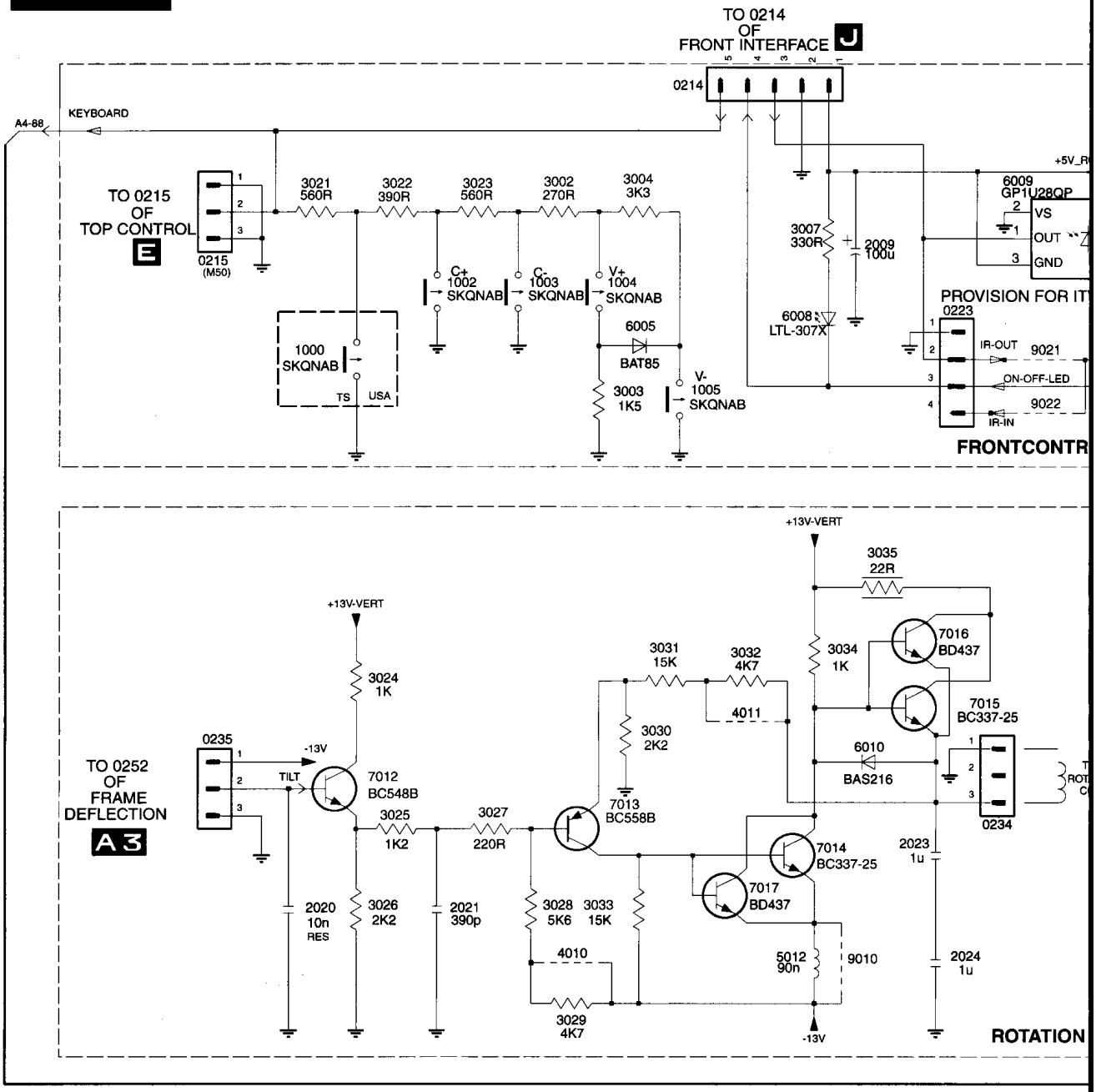

A6 AUDIO
HEADPHONE AMPLIFIER
TO 0202 OF POWER SUPPLY A1
0230
3712 8K2
2714 1n
2715 100u
7703-A TDA1308T
2V5
5V
+5V
A4-33 HEADPHONE-L
4701
2711 470n
3722 2K7
3714 2K7
4702
470n 2725
2724 470n
3718 2K7
3715 3K3
2726 100u
+5V_GND
0275
PROVISION FOR FLYOVER WIRE TO 0240 PIN 9
3723 3K3
2713 100n
2712 100u
10V7
3721 100K
7710 BC847B
30V5
3732 100K
2701 2u2
2703 2u2
7703-B TDA1308T
A4-50 HEADPHONE-R
4703
2716 470n
3719 2K7
2717 1n
3716 8K2
4704
3736 1R5
3737 1R5
A4-35 AUDIO-L
3727 10R
A4-53 AUDIO-R
3728 10R
+27V
A4-30 SOUND-ENABLE
A4-52 AUDIO-SW
A4-54 STAND-BY
3726 10R
A1-100 POWER-DOWN
3730 27K
3V5
BC857B 7711
6V2
3731 27K
2731 1u
2732 1u
0225
A4-34 AUDIO-C
A4-51 AUDIO-SURR
PROVISION FOR DOLBY PROLOGIC
9718
S_GND
A1
50mV / div AC
0.5ms / div
A2
50mV / div A
0.5ms / div



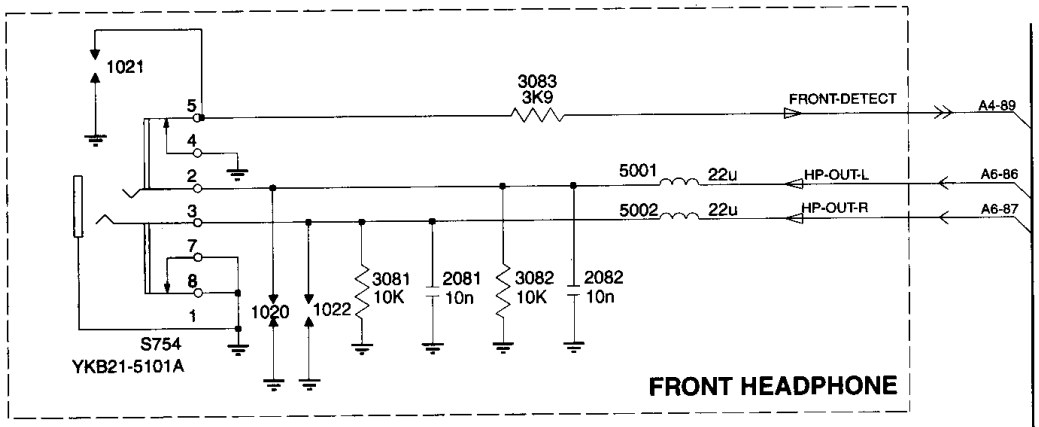
0225 G3
0230 A2
0246 D11
0247 F11
0275 D5
2701 C7
2702 D8
2703 D7
2704 D9
2705 F9
2706 D11
2707 D11
2708 B8
2709 D10
2711 B3
2712 B5
2713 B5
2714 B4
2715 B5
2716 E3
2717 E4
2718 D5
2719 D8
2720 E8
2722 C7
2723 D7
2724 C3
2725 C3
2726 C5
2727 D10
2728 E10
2729 D9
2730 E9
2731 G7
2732 G7
2733 G8
3701 D8
3702 E8
3703 G10
3704 E7
3705 E8
3706 E7
3707 F8
3708 B8
3709 B7
3710 G7
3711 G7
3712 B4
3713 G8
3714 C3
3715 C5
3716 E4
3717 G9
3718 D3
3719 E3
3720 G9
3721 B6
3722 B3
3723 C5
3724 C7
3725 D7
3726 F2
3727 F2
3728 F2
3730 G4
3731 G4
3732 C6
3733 C7
3734 D10
3735 D9
3736 F6
3737 F6
4701 B2
4702 C3
4703 D2
4704 E3
6701 B8
7701 E8
7702 B8
7703-A B4
7703-B D4
7704 C7
7710 B7
7711 G4
7712 G8
9718 H2

Front control / Rotation / Headphone

A7 FRONT CONTROL / ROTATION / HEAD



PHONE

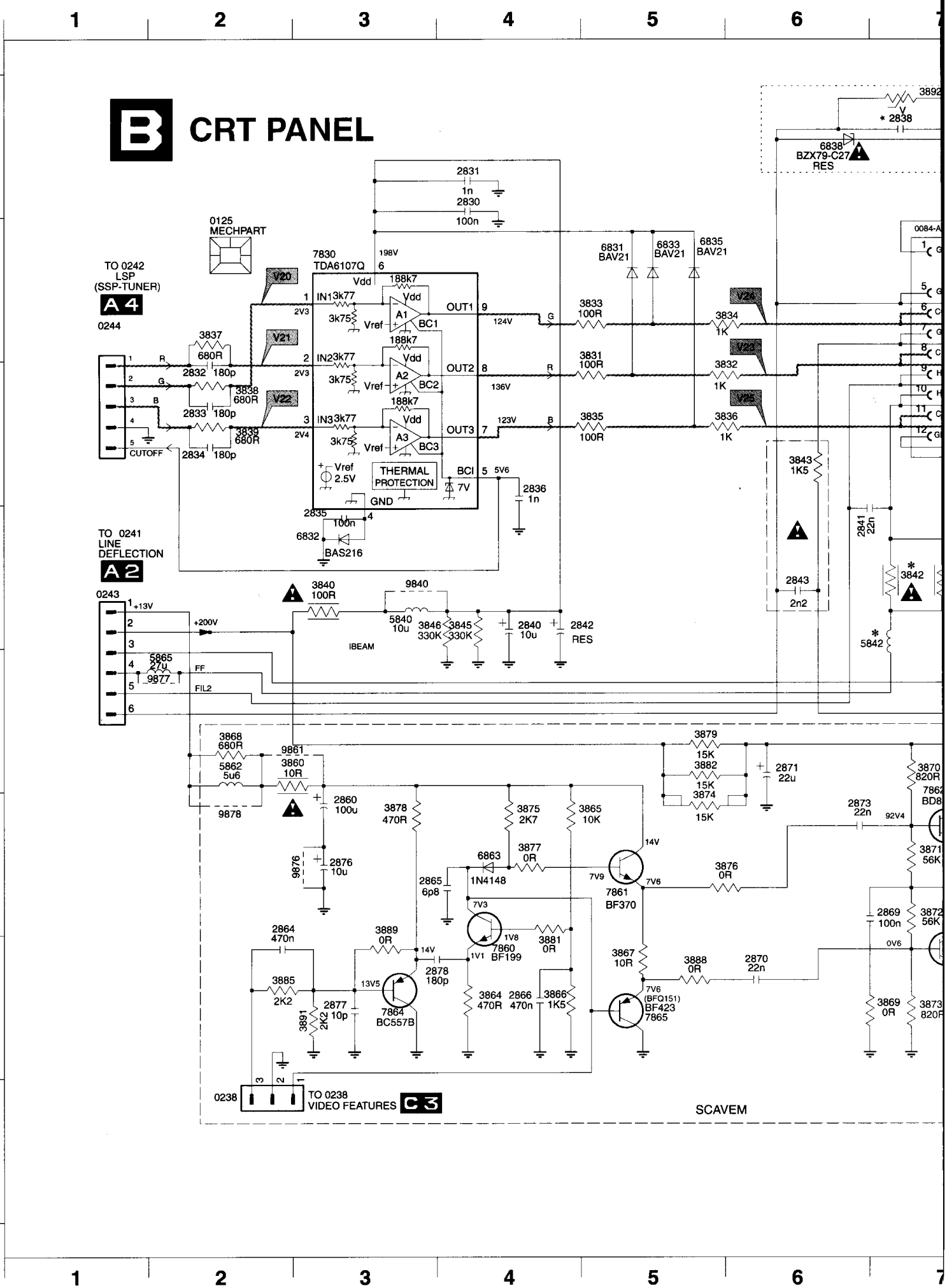


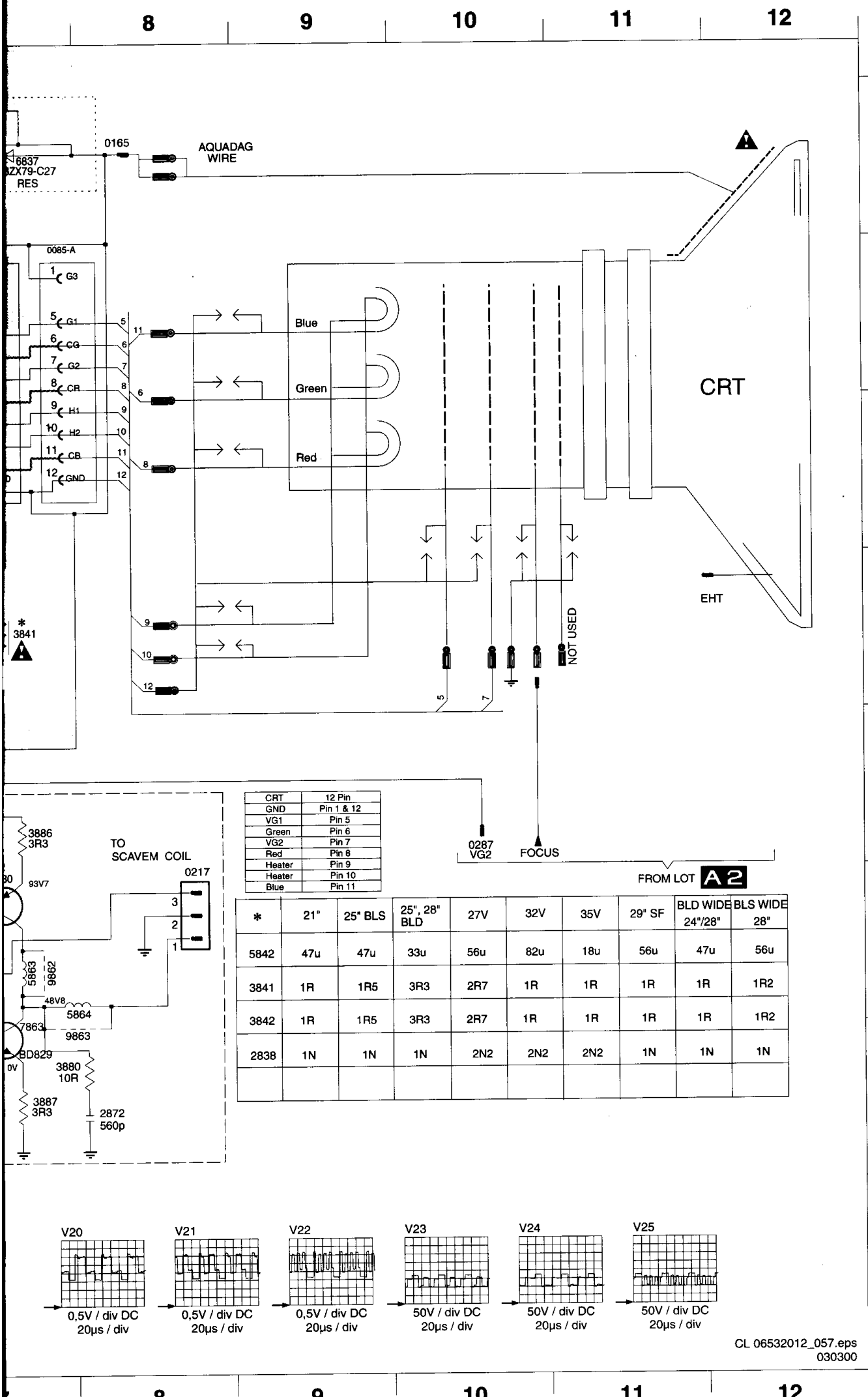
RC5
A4-56
A4-36

CL 06532012_056.eps
230200

0214 B5
0215 B2
0223 C6
0234 E6
0235 E2
1000 C3
1002 C4
1003 C4
1004 C4
1005 C5
1020 F9
1021 E8
1022 F9
2009 B6
2020 F3
2021 F4
2023 F6
2024 F6
2081 F10
2082 F10
3002 B4
3003 C5
3004 B5
3007 B5
3021 B3
3022 B3
3023 B4
3024 E3
3025 E3
3026 F3
3027 E4
3028 F4
3029 F4
3030 E5
3031 D5
3032 E5
3033 F4
3034 D6
3035 D6
3081 F9
3082 F10
3083 E10
4010 F4
4011 E5
5001 E10
5002 F10
5012 F5
6005 C5
6008 C5
6009 B7
6010 E6
7012 E3
7013 E4
7014 F6
7015 E6
7016 D6
7017 F5
9010 F6
9021 C7
9022 C7
S754 F9

CRT panel


B CRT PANEL
0125 MECHPART
TO 0242 LSP (SSP-TUNER) A4
0244
7830 TDA6107Q
198V
Vdd
IN1 IN2 IN3
3k75
Vref
A1 A2 A3
BC1 BC2 BC3
OUT1 OUT2 OUT3
124V
136V
123V
THERMAL PROTECTION
GND
BCI
7V
5V6
Vref 2.5V
CUTOFF
TO 0241 LINE DEFLECTION A2
0243
+13V
+200V
FF
FIL2
IBEAM
BAS216
6838 BZX79-C27 RES
6831 BAV21
6833 BAV21
6835 BAV21
3840 100R
9840
5840 10u
3846 330K
3845 330K
2840 10u
2842 RES
3843 1K5
2841 22n
2843 2n2
3842
5842
3868 680R
5862 5u6
9878
9861
3860 10R
2860 100u
9876
2876 10u
3878 470R
3875 2K7
3865 10K
3879 15K
3882 15K
3874 15K
2871 22u
6863 1N4148
3877 0R
2865 6p8
7861 BF370
3876 0R
2873 22n
3870 820R
3871 56K
2869 100n
3872 56K
3869 0R
3873 820R
2864 470n
3889 0R
3885 2K2
2877 10p
3891 2K2
2878 180p
7864 BC557B
3864 470R
2866 470n
3866 1K5
3881 0R
7860 BF199
3867 10R
3888 0R
2870 22n
7865 BF423
3837 680R
3838 680R
3839 680R
2832 180p
2833 180p
2834 180p
2835 100n
2836 1n
2831 1n
2830 100n
3833 100R
3831 100R
3835 100R
3834 1K
3832 1K
3836 1K
0238 TO 0238 VIDEO FEATURES C3
SCAVEM



CRT	12 Pin
GND	Pin 1 & 12
VG1	Pin 5
Green	Pin 6
VG2	Pin 7
Red	Pin 8
Heater	Pin 9
Heater	Pin 10
Blue	Pin 11

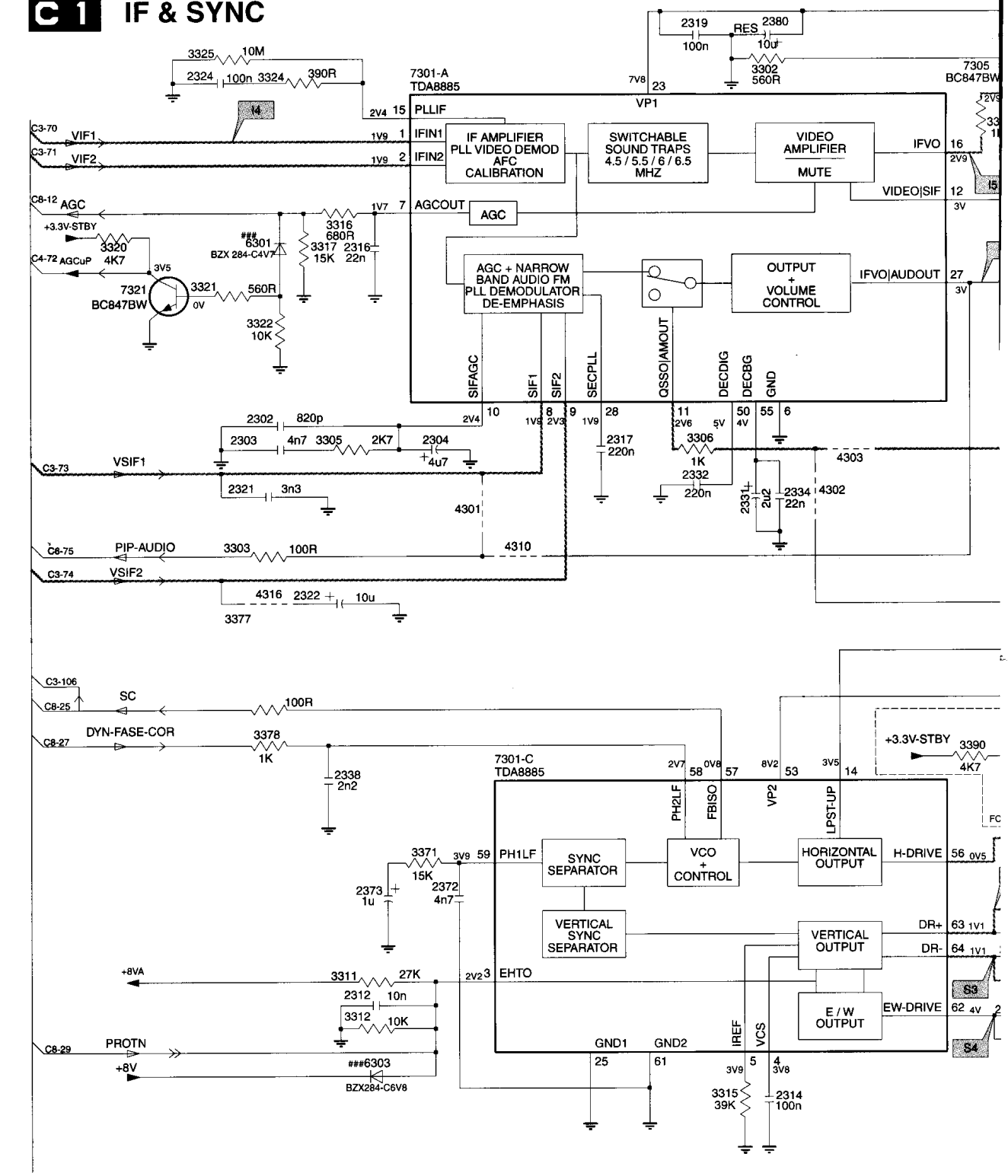
*	21"	25" BLS	25", 28" BLD	27V	32V	35V	29" SF	BLD WIDE 24"/28"	BLS WIDE 28"
5842	47u	47u	33u	56u	82u	18u	56u	47u	56u
3841	1R	1R5	3R3	2R7	1R	1R	1R	1R	1R2
3842	1R	1R5	3R3	2R7	1R	1R	1R	1R	1R2
2838	1N	1N	1N	2N2	2N2	2N2	1N	1N	1N

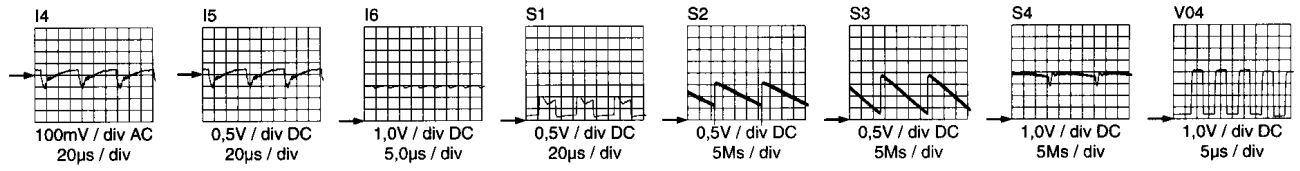
CL 06532012_057.eps
030300

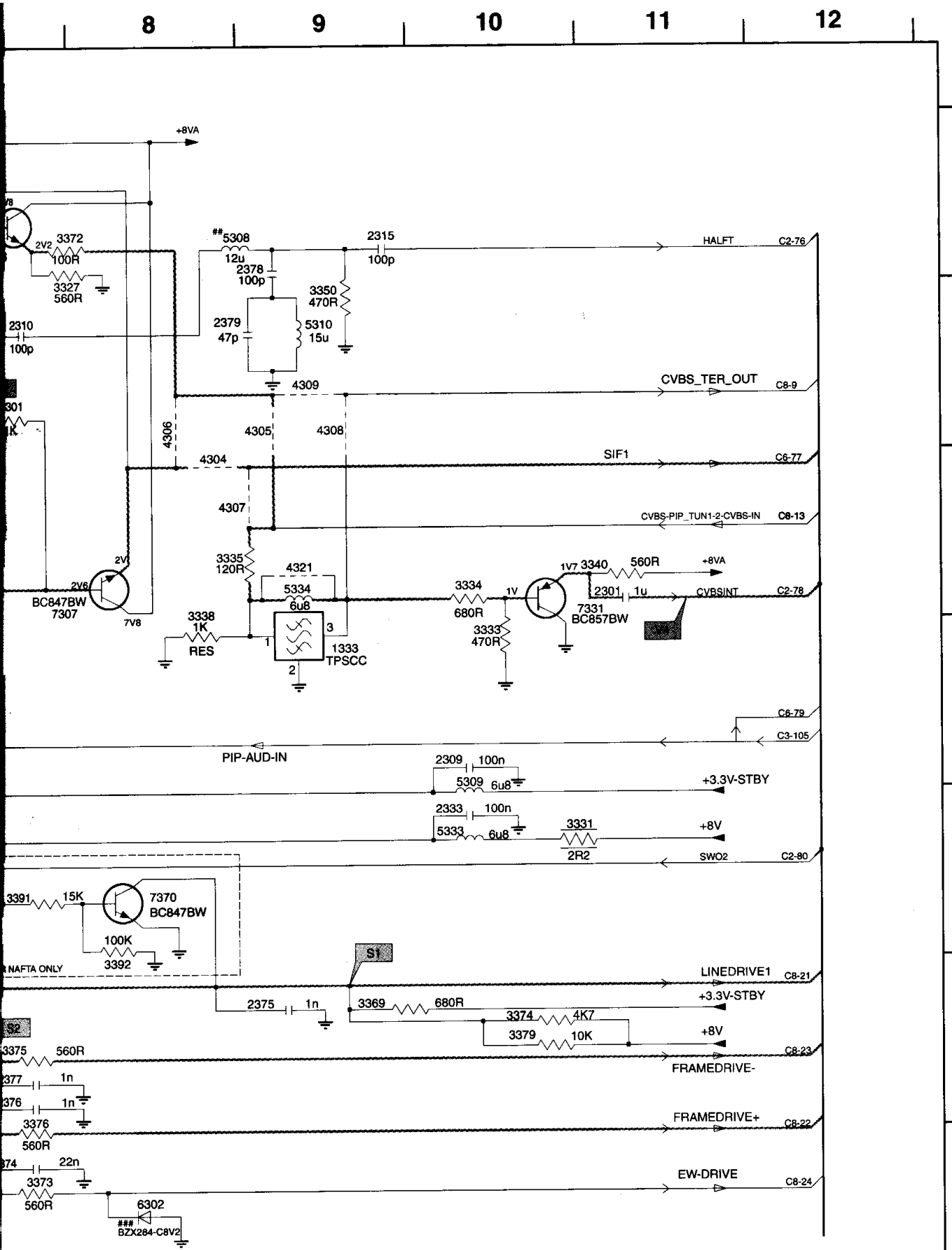
0084-A B7
0085-A B8
0125 B2
0165 A8
0217 F8
0238 H2
0243 D1
0244 B1
0287 E10
2830 A4
2831 A4
2832 C2
2833 C2
2834 C2
2835 D3
2836 C4
2838 A7
2840 D4
2841 D6
2842 D5
2843 D6
2860 F3
2864 F2
2865 F3
2866 G4
2869 F7
2870 G6
2871 E6
2872 G8
2873 F6
2876 F3
2877 G3
2878 G3
3831 B5
3832 C6
3833 B5
3834 B6
3835 C5
3836 C6
3837 B2
3838 C2
3839 C2
3840 D3
3841 D7
3842 D7
3843 C6
3845 D4
3846 D3
3860 E2
3864 G4
3865 F5
3866 G4
3867 G5
3868 E2
3869 G7
3870 E7
3871 F7
3872 F7
3873 G7
3875 F4
3876 F6
3877 F4
3878 F3
3879 E5
3880 G7
3881 G4
3882 F5
3885 G2
3886 E7
3887 G7
3888 G5
3889 F3
3891 G3
3892 A7
5840 D3
5842 D7
5862 E2
5863 F7
5864 F8
5865 E2
6831 B5
6832 D3
6833 B5
6835 B5
6837 A7
6838 A6
6863 F4
7830 B3
7860 G4
7861 F5
7862 E7
7863 G7
7864 G3
7865 G5
9840 D3
9861 E2
9862 F7
9863 G7
9876 F3
9877 E2
9878 F2

IF & SYNC

C 1 IF & SYNC



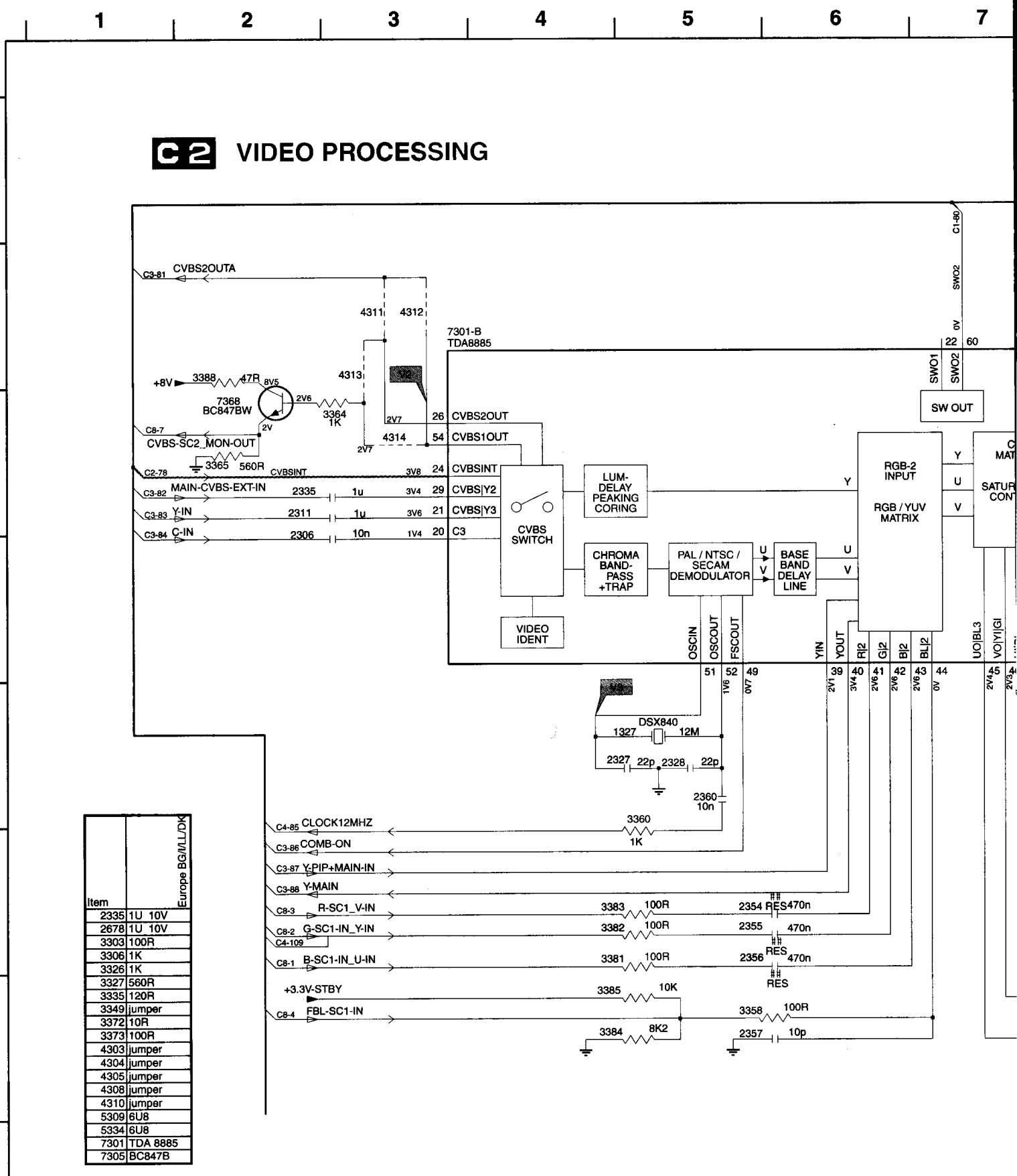




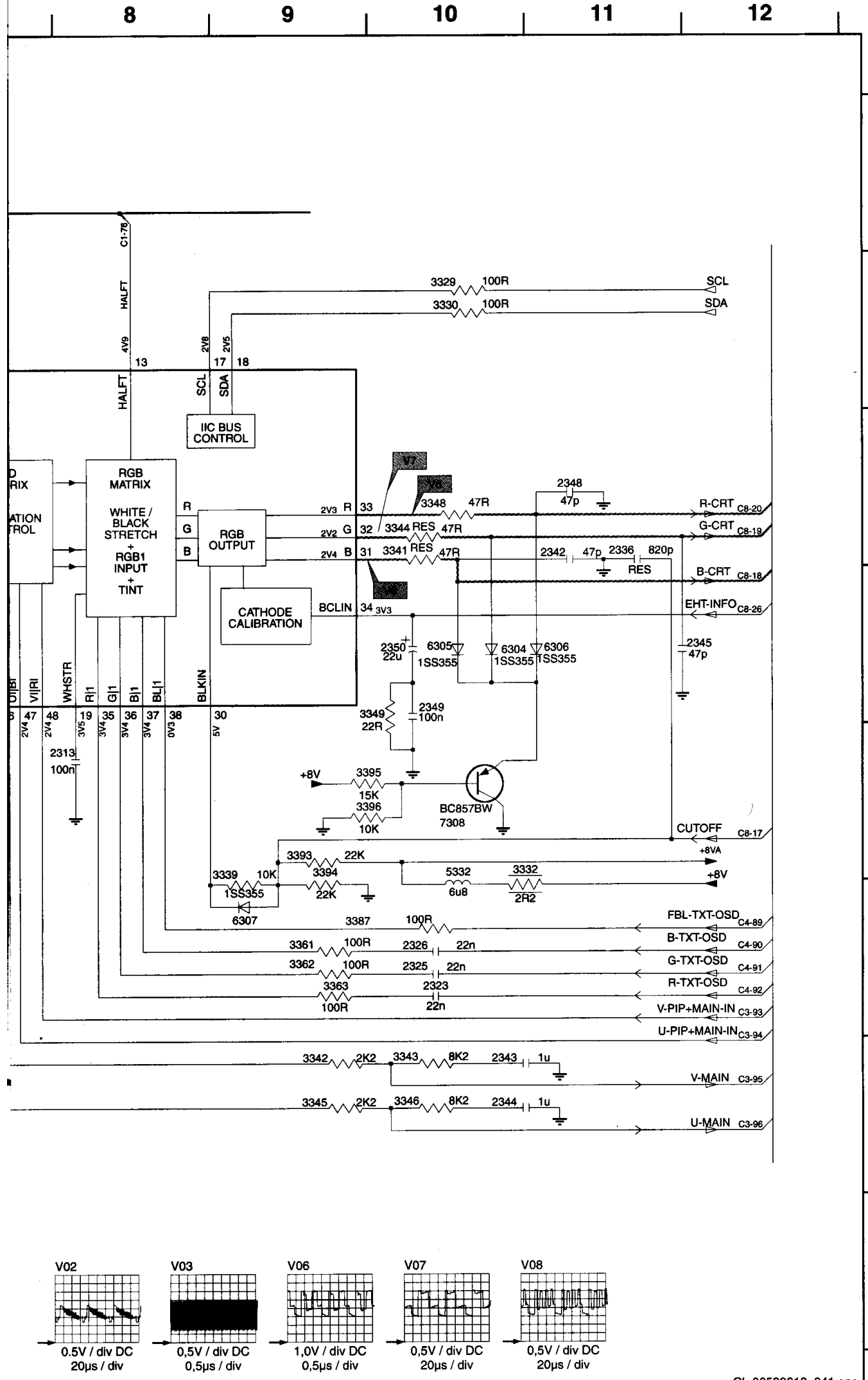
CL 06532012_040.eps
030300

1333 D10
2301 D11
2302 C3
2303 C2
2304 C4
2309 D10
2310 B8
2312 G3
2314 G6
2315 A10
2316 B3
2317 C5
2319 A5
2321 D2
2322 E3
2324 A2
2331 D6
2332 D5
2333 E10
2334 D6
2338 E3
2372 F4
2373 F3
2374 G7
2375 F9
2376 F7
2377 F7
2378 A10
2379 B10
2380 A6
3301 B8
3302 A6
3303 D2
3305 C3
3306 C6
3311 G3
3312 G3
3315 G5
3316 B3
3317 B3
3320 B2
3321 B2
3322 C3
3324 A3
3325 A2
3326 A8
3327 B9
3331 E11
3333 D10
3334 D10
3335 C9
3338 D9
3340 C11
3350 B10
3369 F9
3371 F4
3372 A9
3373 G7
3374 F10
3375 F7
3376 F7
3377 E2
3378 E3
3379 F10
3390 E7
3391 E7
3392 F8
4301 D4
4302 D7
4303 C7
4304 C9
4305 C9
4306 B9
4307 C9
4308 C10
4309 B9
4310 D4
4316 E3
4321 C9
5308 A10
5309 D10
5310 B10
5333 E10
5334 D9
6301 B3
6302 G8
6303 G3
7301-A A3
7301-C E4
7305 B8
7307 C8
7321 B2
7331 D10
7370 E8

Video processing

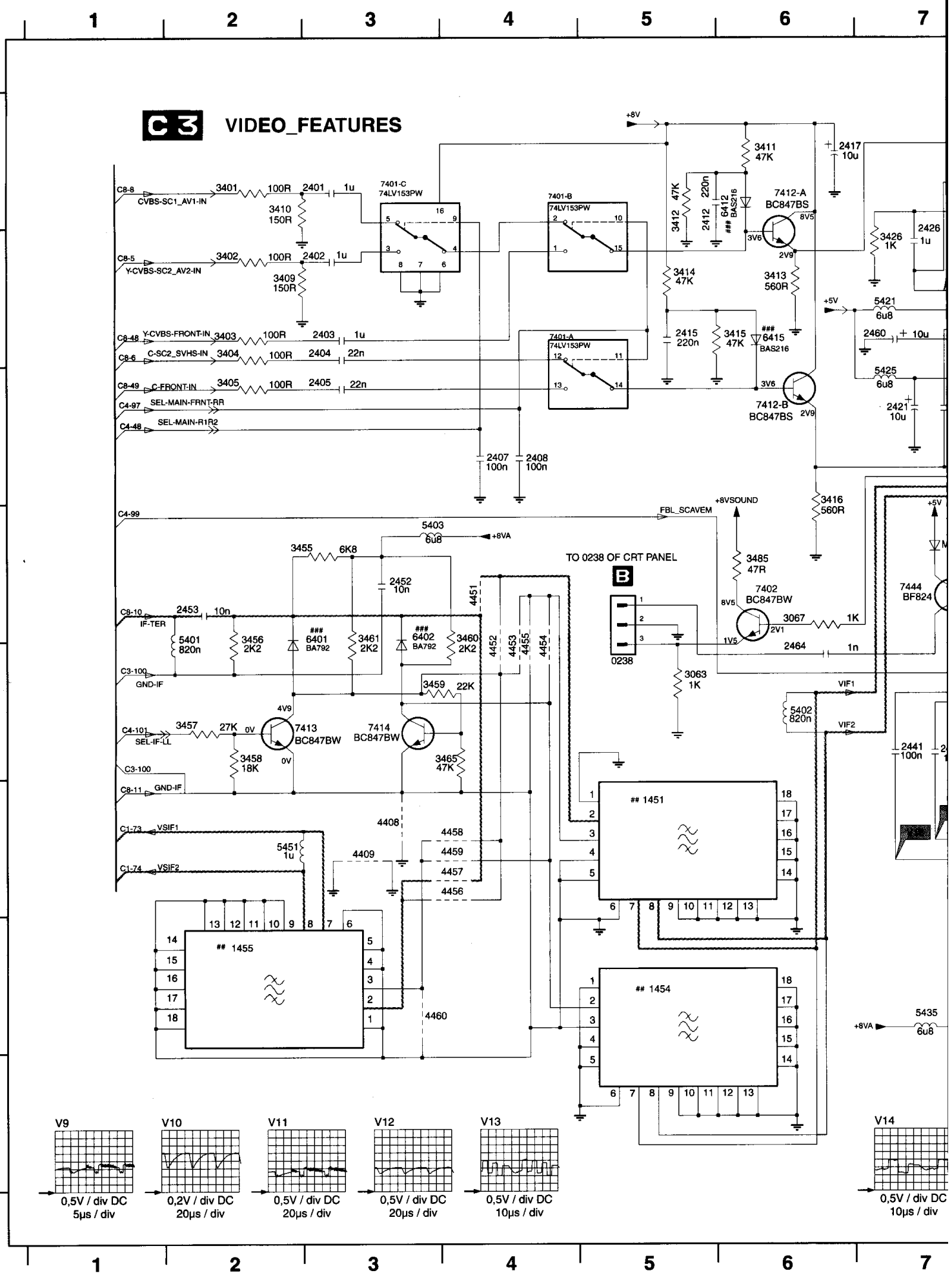


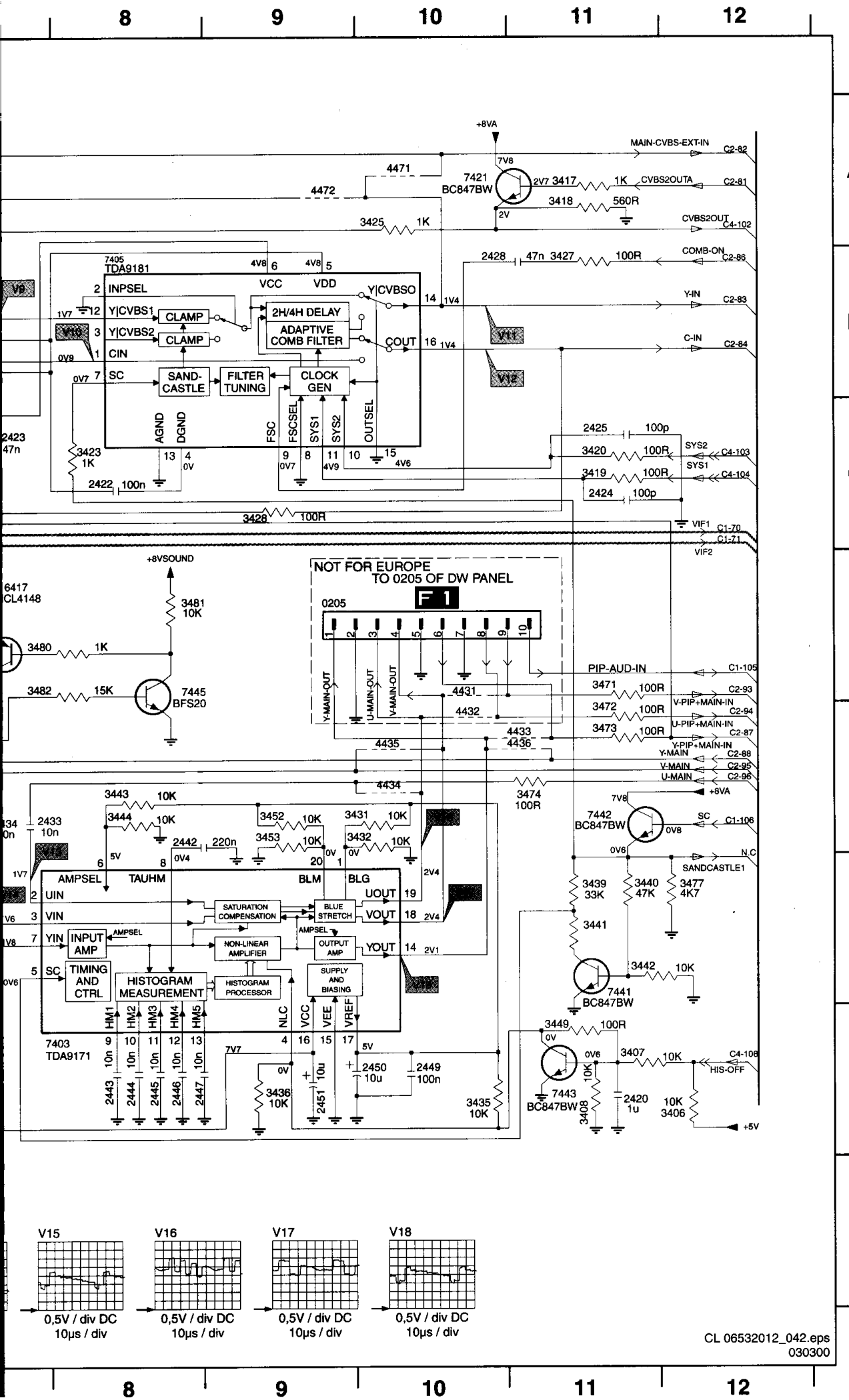
Item	Europe BG/I/LL'/DK
2335	1U 10V
2678	1U 10V
3303	100R
3306	1K
3326	1K
3327	560R
3335	120R
3349	jumper
3372	10R
3373	100R
4303	jumper
4304	jumper
4305	jumper
4308	jumper
4310	jumper
5309	6U8
5334	6U8
7301	TDA 8885
7305	BC847B



1327 E5
2306 D2
2311 C2
2313 E8
2323 F10
2325 F10
2326 F10
2327 E5
2328 E5
2335 C2
2336 C11
2342 C11
2343 G10
2344 G10
2345 D12
2348 C11
2349 D10
2350 D10
2354 F5
2355 F5
2356 F5
2357 G5
2360 E5
3329 B10
3330 B10
3332 E10
3339 E9
3341 C10
3342 G9
3343 G10
3344 C10
3345 G9
3346 G10
3348 C10
3349 D10
3358 G5
3360 E3
3361 F9
3362 F9
3363 F9
3364 C3
3365 C2
3381 F4
3382 F4
3383 F4
3384 G4
3385 G4
3387 F9
3388 B2
3393 E9
3394 E9
3395 E10
3396 E10
4311 B3
4312 B3
4313 B3
4314 C3
5332 E10
6304 D10
6305 D10
6306 D11
6307 F9
7301-B B3
7308 E10
7368 C2

Video features





0205 D10
0238 E5
1451 F5
1454 G5
1455 G2
2401 A3
2402 B3
2403 B3
2404 B3
2405 C3
2407 C4
2408 C4
2412 A5
2415 B5
2417 A6
2420 G11
2421 C7
2422 C8
2423 C7
2424 C11
2425 C11
2426 A7
2428 B10
2433 E7
2434 E7
2441 E7
2442 E8
2443 G8
2444 G8
2445 G8
2446 G8
2447 G8
2449 G10
2450 G10
2451 G9
2452 D3
2453 D2
2460 B7
2464 E6
3063 E5
3067 D6
3401 A2
3402 B2
3403 B2
3404 B2
3405 C2
3406 G12
3407 G11
3408 G11
3409 B2
3410 A2
3411 A6
3412 A5
3413 B6
3414 B5
3415 B6
3416 C6
3417 A11
3418 A11
3419 C11
3420 C11
3423 C8
3425 A10
3426 B7
3427 B11
3428 C9
3431 E10
3432 E10
3435 G10
3436 G9
3439 F11
3440 F11
3441 F11
3442 F11
3443 E8
3444 E8
3449 G11
3452 E9
3453 E9
3455 D2
3456 D2
3457 E2
3458 E2
3459 E3
3460 D4
3461 D3
3465 F4
3471 D11
3472 E11
3473 E11
3474 E11
3477 F12
3480 D7
3481 D8
3482 D7
3485 D6
4408 F3
4409 F3
4431 D10
4432 E10
4433 E10
4434 E10
4435 E10
4436 E10
4451 D4
4452 D4
4453 D4
4454 D4
4455 D4
4456 F4
4457 F4
4458 F4
4459 F4
4460 G3
4471 A10
4472 A9
5401 D2
5402 E6
5403 D3
5421 B7
5425 C7
5435 G7
5451 F2
6401 E3
6402 D3
6412 A6
6415 B6
6417 D7
7401 A3
7402 D6
7403 G7
7405 B8
7412-A A6
7412-B C6
7413 E2
7414 E3
7421 A10
7441 F11
7442 E11
7443 G11
7444 D7
7445 D8

Diversity tables SSB panel

Diversity tables diagram C3

Item	Histogram No PIP/DW	No Histogram/PIP/DW
2420	100P 50V	,
2433	10N 50V	,
2434	10N 50V	,
2441	100N 16V	,
2442	220N 16V	,
2443	10N 50V	,
2444	10N 50V	,
2445	10N 50V	,
2446	10N 50V	,
2447	10N 50V	,
2449	100N 16V	,
2450	10U 16V	,
2451	10U 16V	,
3406	10K	,
3407	10K	,
3408	10K	,
3432	jumper	,
3435	22K	,
3436	33K	,
3439	10K	,
3443	jumper	,
3444	220K	,
3453	jumper	,
3477	4K7	,
3477	,	4K7
4434	,	jumper
4435	,	jumper
4436	,	jumper
5435	6U8	,
7403	TDA9171	,
7443	BC847	,

Item	SAW filter EU BG/I/LL/DK
1451	OFWK3953L
1454	-
1455	OFWK9656L
2452	10N 50V
3455	6K8
3456	2K2
3457	27K
3458	18K
3459	-
3460	-
3461	2K2
3465	-
4451	jumper
4452	-
4453	-
4455	jumper
4457	jumper
4458	jumper
4460	-
5403	6U8
6401	1SS356
6402	-
7413	BC847BW
7414	-

Diversity table diagram C4

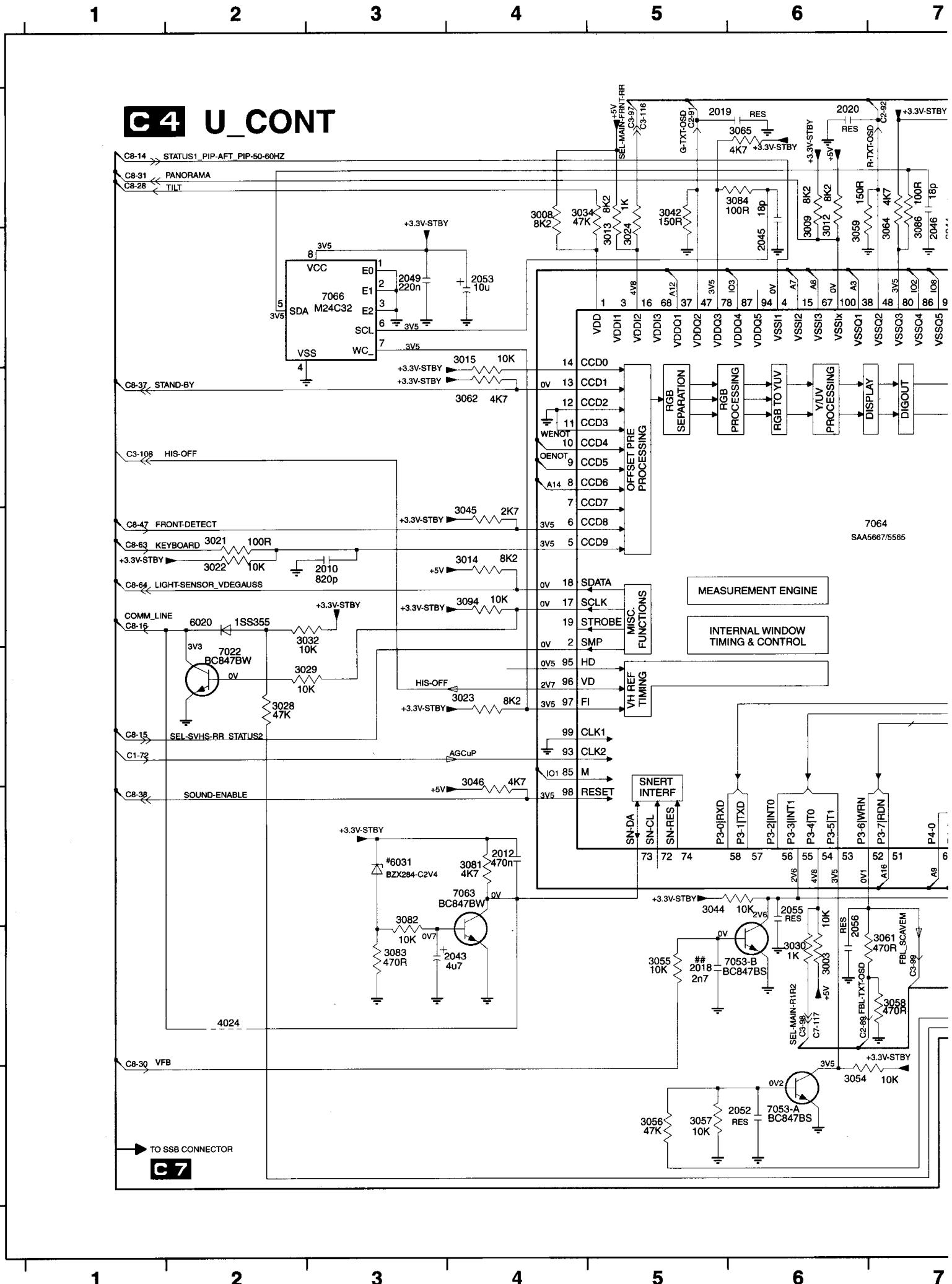
Item	West EU 100Pg Txt	West EU 10Pg Txt	East EU 10Pg Txt	
2058	100N 16V	,	,	10
3028	47K	,	,	47
3029	10K	,	,	10
3032	10K	,	,	10
3033	10K	,	,	10
3090	10K	,	,	10
3091	10K	,	,	10
3094	10K	,	,	10
5050	5U6	,	,	5U
6020	1SS355	,	,	1S
7022	BC847	,	,	BC
7070	UPD431000	,	,	UP

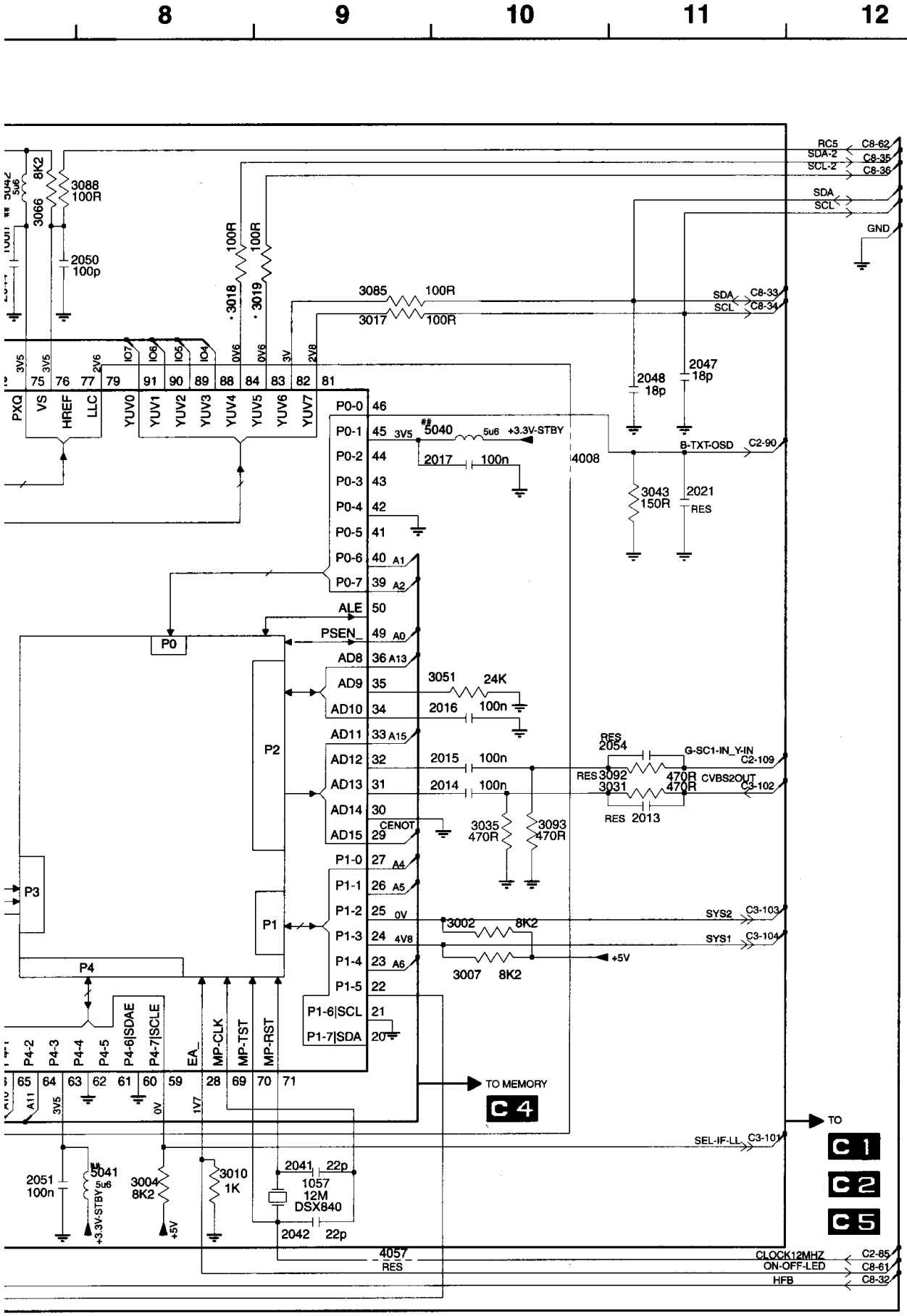
Diversity table diagram C7

Item	Virtual Dolby EU	Incredible Surround E	East EU 100Pg Txt
2631	1U 10V	,	
2633	1U 10V	,	
2643	,	1U 10V	
2646	,	1U 10V	
2679	,	100N 16V	
2682	,	1U 10V	
2683	,	1U 10V	
2684	,	1U 10V	
2685	,	1U 10V	
2686	,	1U 10V	
2687	,	1U 10V	
2690	,	1U 10V	
2691	,	1U 10V	
3643	,	56K	
3644	,	100K	
3645	,	1K	
3646	,	56K	
3647	,	100K	
3648	,	1K	
3680	,	10R	
3681	,	10R	
4640	jumper	,	
4642	jumper	,	
7630	,	74HC4052	
7645	,	BC847B	

CL 06532012_061.eps
100300

U Cont

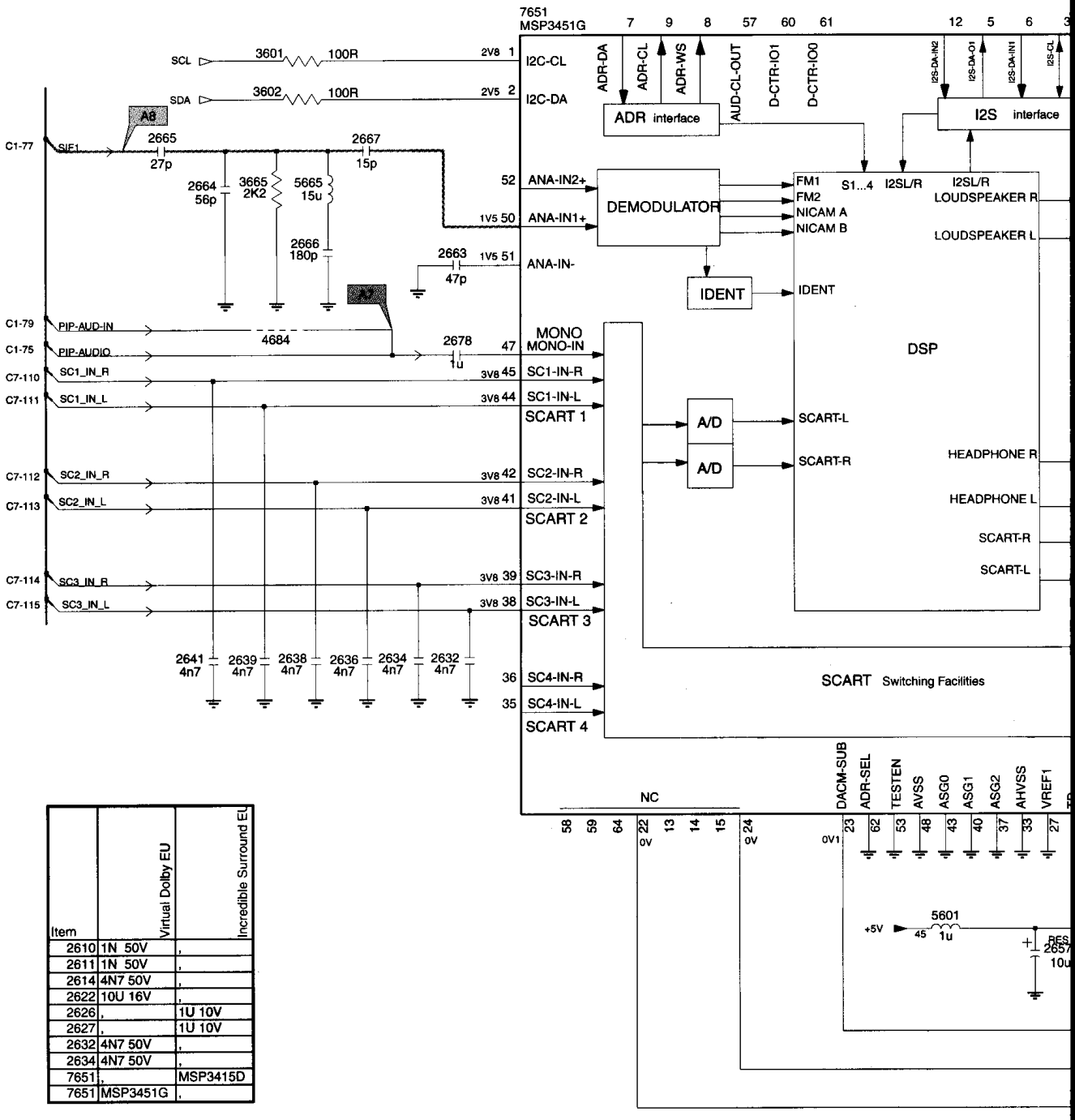

C4 U_CONT
C8-14 STATUS1_PIP-AFT_PIP-50-60HZ
C8-31 PANORAMA
C8-28 TILT
C8-37 STAND-BY
C3-108 HIS-OFF
C8-47 FRONT-DETECT
C8-63 KEYBOARD
C8-64 LIGHT-SENSOR_VDEGAUSS
COMM_LINE
C8-16
C8-15 SEL-SVHS-RR STATUS2
C1-72
C8-38 SOUND-ENABLE
C8-30 VFB
4024
TO SSB CONNECTOR
C7
7066 M24C32
VCC
VSS
SDA
SCL
WC_
E0
E1
E2
7064 SAA5667/5565
OFFSET PRE PROCESSING
RGB SEPARATION
RGB PROCESSING
RGB TO YUV
Y/UV PROCESSING
DISPLAY
DIGOUT
MISC. FUNCTIONS
VH REF TIMING
MEASUREMENT ENGINE
INTERNAL WINDOW TIMING & CONTROL
SNERT INTERF
SEL-MAIN-FRNT-RR
G-TXT-OSD
R-TXT-OSD
FBL-TXT-OSD
FBL_SCAVEM
SEL-MAIN-R1R2
7053-A BC847BS
7053-B BC847BS
7063 BC847BW
7022 BC847BW
#6031 BZX284-C2V4
1SS355
+3.3V-STBY
+5V
0V



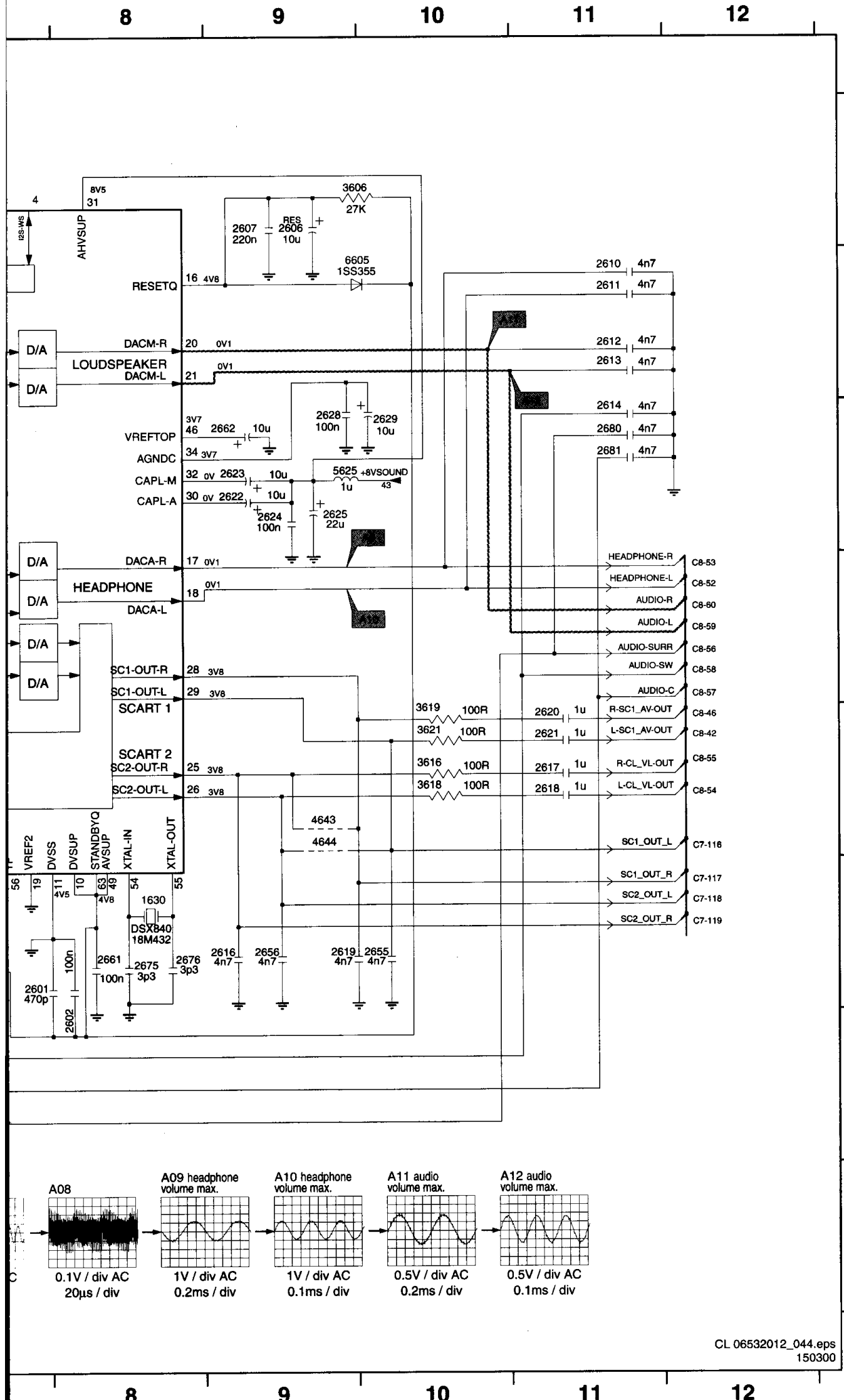
1057 G9
2010 D3
2012 F4
2013 E11
2014 D10
2015 D10
2016 D10
2017 B10
2018 G5
2019 A5
2020 A6
2021 C11
2041 G9
2042 G9
2043 G4
2044 B7
2045 B6
2046 B7
2047 B11
2048 B11
2049 B3
2050 B8
2051 G7
2052 H6
2053 B4
2054 D11
2055 F6
2056 G6
3002 E10
3003 G6
3004 G8
3007 E10
3008 B4
3009 B6
3010 G8
3012 A6
3013 B5
3014 D4
3015 B4
3017 B9
3018 B8
3019 B9
3021 D2
3022 D2
3023 E4
3024 B5
3028 D2
3029 E2
3030 G6
3031 D11
3032 D3
3034 B5
3035 E10
3042 B5
3043 C11
3044 F5
3045 D4
3046 E4
3051 D10
3054 H6
3055 G5
3056 H5
3057 H5
3058 G7
3059 B6
3061 G7
3062 C4
3064 B7
3065 A6
3066 A7
3081 F4
3082 F3
3083 G3
3084 A6
3085 B9
3086 B7
3088 A7
3092 D11
3093 E10
3094 D4
4008 B10
4024 G2
4057 G9
5040 B10
5041 G8
5042 A7
6020 D2
6031 F3
7022 E2
7053-A H6
7053-B G5
7063 F4
7064 D7
7066 B3

Audio processing

C6 AUDIO PROCESSING



Item	Virtual Dolby EU	Incredible Surround EU
2610	1N 50V	,
2611	1N 50V	,
2614	4N7 50V	,
2622	10U 16V	,
2626	,	1U 10V
2627	,	1U 10V
2632	4N7 50V	,
2634	4N7 50V	,
7651	,	MSP3415D
7651	MSP3451G	,

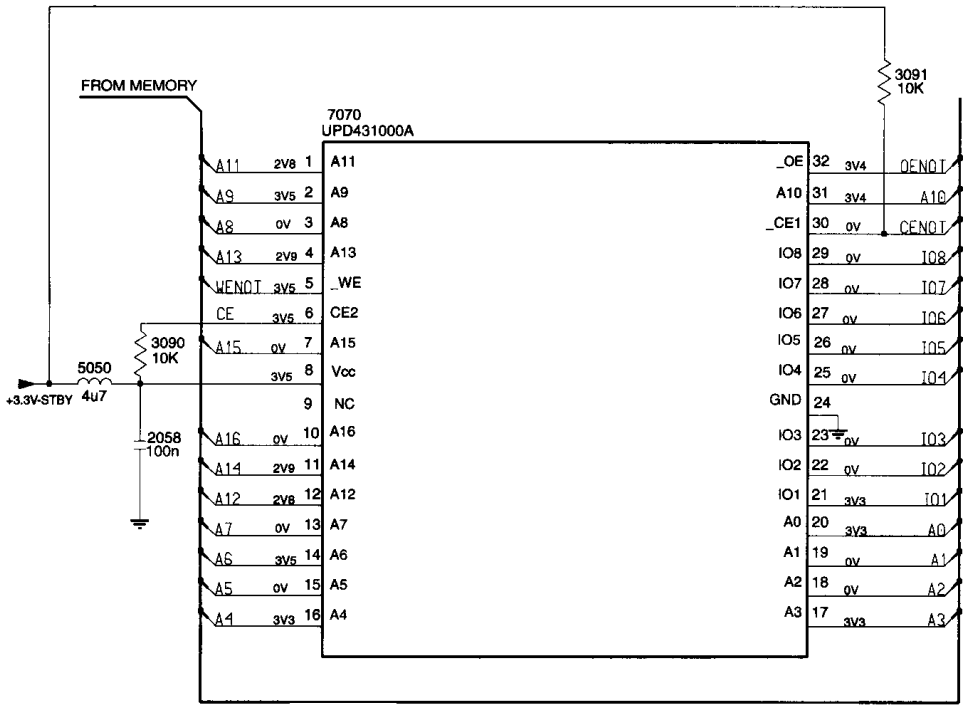


1630 F8
2601 G7
2602 G8
2606 A9
2607 A9
2610 B11
2611 B11
2612 B11
2613 B11
2614 C11
2616 F9
2617 E11
2618 E11
2619 F10
2620 E11
2621 E11
2622 C9
2623 C9
2624 C9
2625 C10
2628 C9
2629 C9
2632 E4
2634 E3
2636 E3
2638 E3
2639 E3
2641 E2
2655 F10
2656 F9
2657 F7
2661 F8
2662 C9
2663 C4
2664 B2
2665 B2
2666 B3
2667 B3
2675 F8
2676 F8
2678 C4
2680 C11
2681 C11
3601 A3
3602 B3
3606 A10
3616 E10
3618 E10
3619 E10
3621 E10
3665 B3
4643 E10
4644 E9
4684 C3
5601 F6
5625 C10
5665 B3
6605 B10
7651 A4

Memory

2058 D2
3090 D2
3091 C6
5050 D2
7070 C3

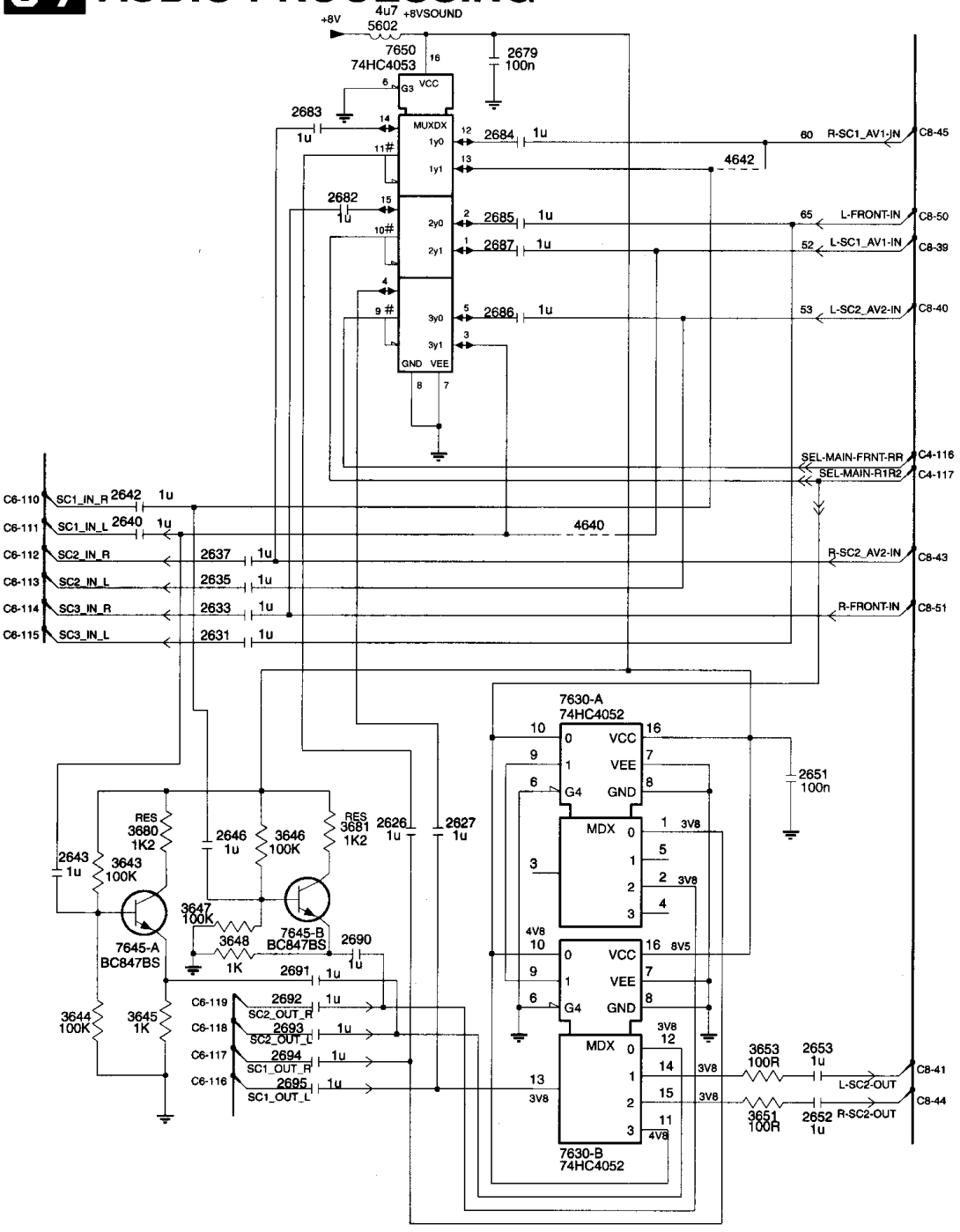
C5 MEMORY



Item	West EU 100Pg Txt	West EU 10Pg Txt	East EU 10Pg Txt	East EU 100Pg Txt
2058	100N 16V	,	,	100N 16V
3028	47K	,	,	47K
3029	10K	,	,	10K
3032	10K	,	,	10K
3033	10K	,	,	10K
3090	10K	,	,	10K
3091	10K	,	,	10K
3094	10K	,	,	10K
5050	5U6	,	,	5U6
6020	1SS355	,	,	1SS355
7022	BC847	,	,	BC847
7070	UPD431000	,	,	UPD431000

CL 06532012_045.eps
290200

C7 AUDIO PROCESSING



CL 06532012_047.eps
220200

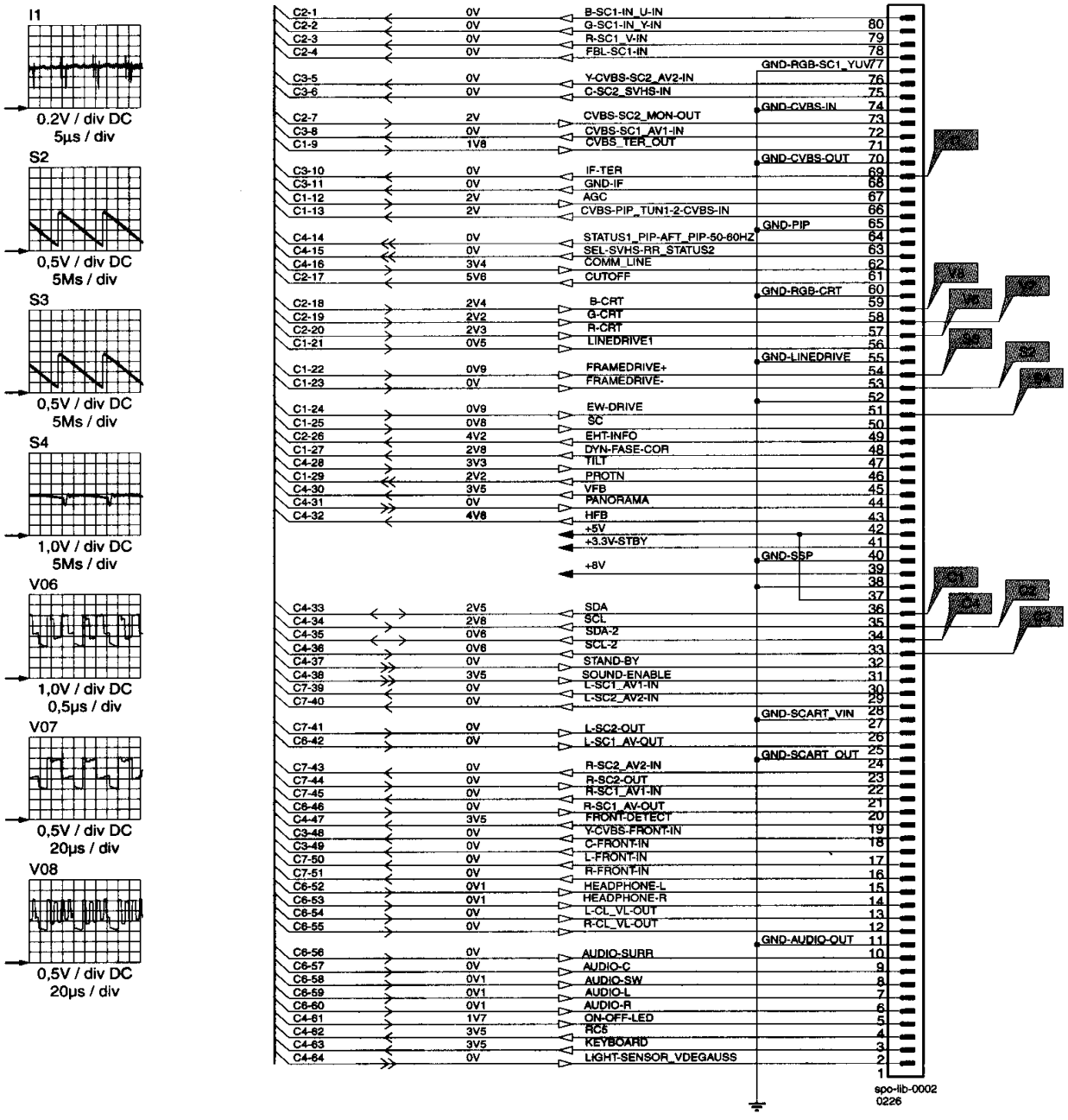
2626 E3
2627 E3
2631 D2
2633 D2
2635 D2
2637 D2
2640 D2
2642 D2
2643 E2
2646 E2
2651 E5
2652 G5
2653 F5
2679 A4
2682 B3
2683 A3
2684 B4
2685 B4
2686 B4
2687 B4
2690 F3
2691 F3
2692 F3
2693 F3
2694 F3
2695 G3
3643 E2
3644 F2
3645 F2
3646 E3
3647 F2
3648 F2
3651 G5
3653 F5
3680 E2
3681 E3
4640 D4
4642 B5
5602 A3
7630 A3
7645-A F2
7645-B F3
7650-A D4
7650-B G4

SSB connector

0226 G5

C 8 SSB_CONNECTOR

TO 0226 OF SSP TUNER A 4 (S30)

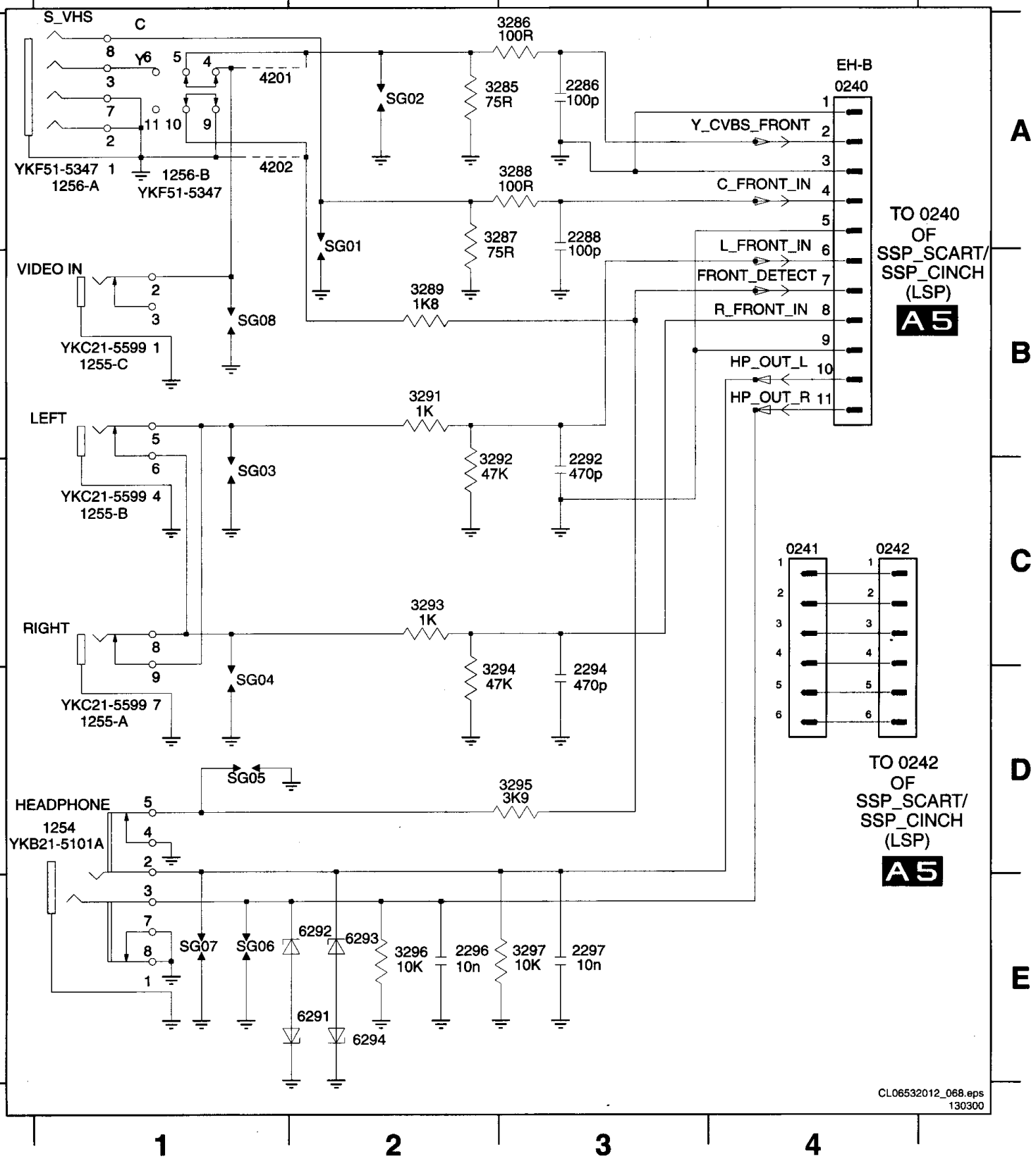


CL 06532012_046.eps
150300

Side I/O

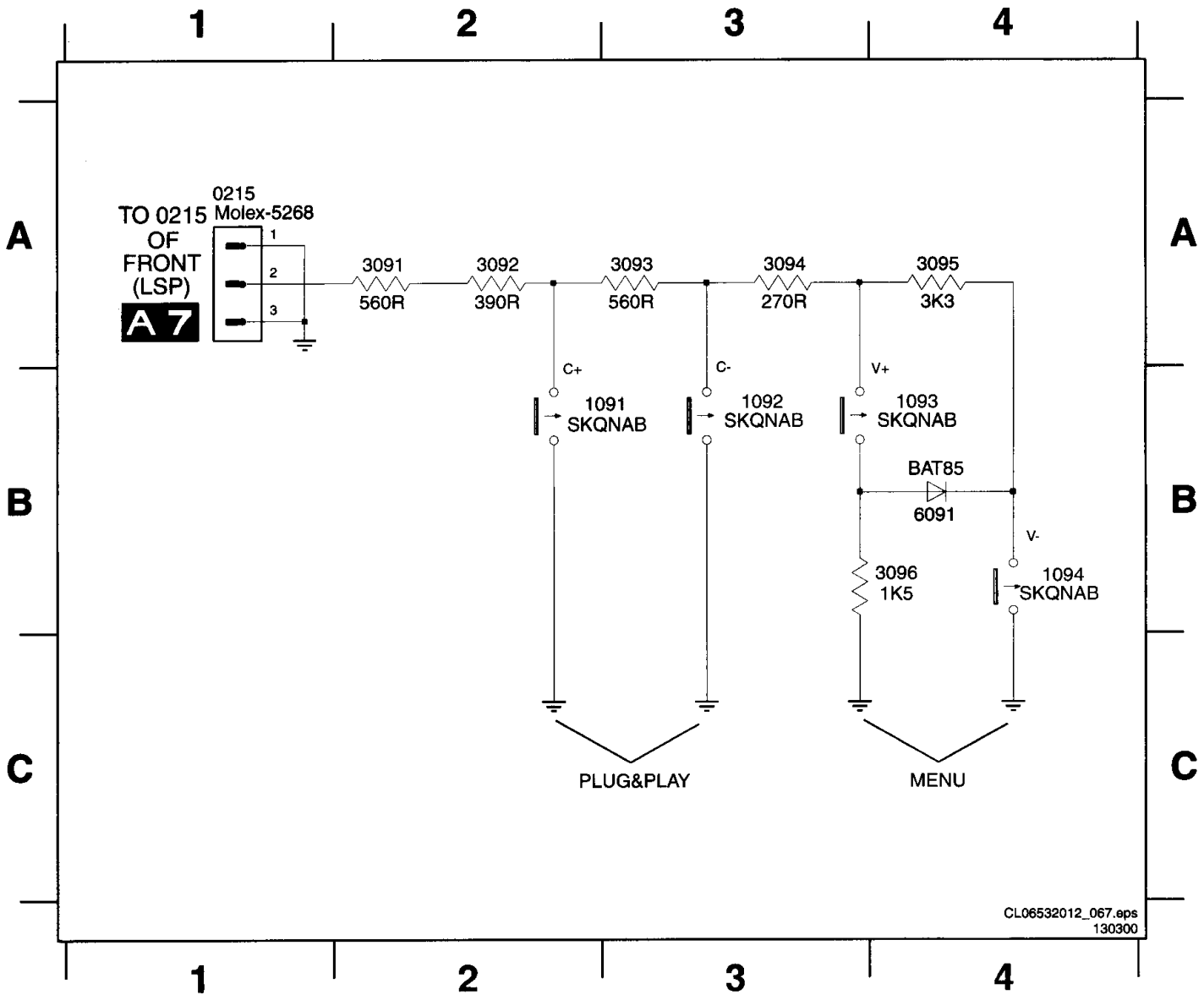
SIDE IO PANEL

0240 A4
0241 C4
0242 C4
1254 D1
1255-A D1
1255-B C1
1255-C B1
1256-A A1
1256-B A1
2286 A3
2288 A3
2292 B3
2294 C3
2296 E2
2297 E3
3285 A3
3286 A3
3287 A3
3288 A3
3289 B2
3291 B2
3292 B2
3293 C2
3294 C3
3295 D3
3296 E2
3297 E3
4201 A1
4202 A1
6291 E2
6292 E2
6293 E2
6294 E2
SG01 B2
SG02 A2
SG03 C1
SG04 D1
SG05 D1
SG06 E1
SG07 E1
SG08 B1



Top control

TOP CONTROL PANEL

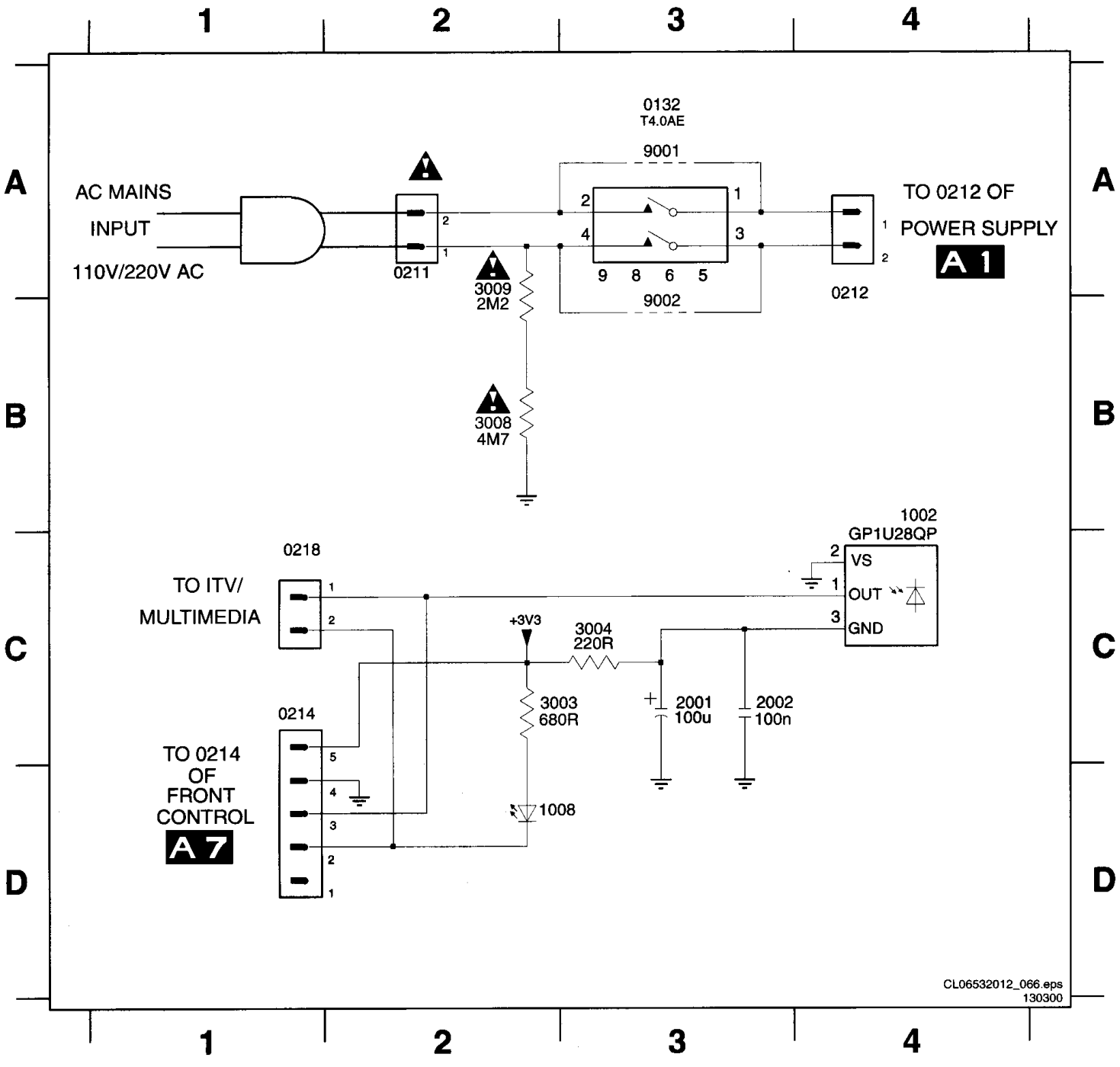


0215 A1
1091 B3
1092 B3
1093 B4
1094 B4
3091 A2
3092 A2
3093 A3
3094 A3
3095 A4
3096 B4
6091 B4

Front interface

J FRONT INTERFACE PANEL

0132 A3	0214 C1	1002 B4	2002 C3	3003 C2	3009 A2
0211 A2	0218 C1	1008 D2	3001 D2	3004 C3	9001 A3
0212 B4	1000 D2	2001 C3	3002 D3	3008 B3	9002 B3



8. Alignments

General: The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5.

8.1 Alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage: 220-240V +/- 10%
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: Ri > 10MΩ Ci < 2.5 pF.

8.2 Electrical alignments

8.2.1 VG2

Rough alignment

Using a pattern generator displaying a circle pattern, adjust the VG2 potmeter of LOT L5630 to obtain normal picture.

Fine adjustment

1. Activate the SAM-menu. Go to the sub-menu " WHITE TONE" and select the subsubmenu NORMAL.
   - Adjust the value of RED, GREEN and BLUE to 40
   - Adjust the value of RED, GREEN and BLUE to 42 for 29" RF.
2. Temporarely leave the SAM-menu and go to the normal user menu. Select sub-menu CONTRAST and set it to 0.
3. Switch OFF the normal user menu and return to the SAM-menu. Disable black current loop by changing the AKB bit.

Connect RF output of the pattern generator to antenna. Test pattern: blank pattern (blank screen on CRT). Set the time base of the oscilloscope to 0.5ms with external triggering of the vertical pulse. Measure the black level pulse during the vertical flyback at the RGB cathodes of the CRT.

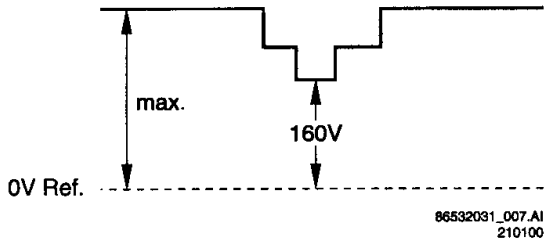


Figure 8-1 Black level pulse

Adjust the highest of the three guns with the VG2 pot meter of the LOT to 160Vdc for 24", 25" and
28" BLD WS" set, while the min. black level voltage 165Vdc is for 28" BLSW, 28" RFW, 29" RF and 32" BLSW picture tubes.

8.2.2 Focus

Set the "SMART" picture setting to "natural".
Using a pattern generator displaying a crosshatch pattern, adjust the focus potmeter of LOT L5431 in such a way that the haze on the vertical lines at 2/3 from the left and right edges of the screen (just) disappears.

8.3 Software alignments (Service Alignment Mode)

With the software alignments of the Service Alignment Mode the geometry, white tone and tuner (IF) can be aligned.

SAM Menu

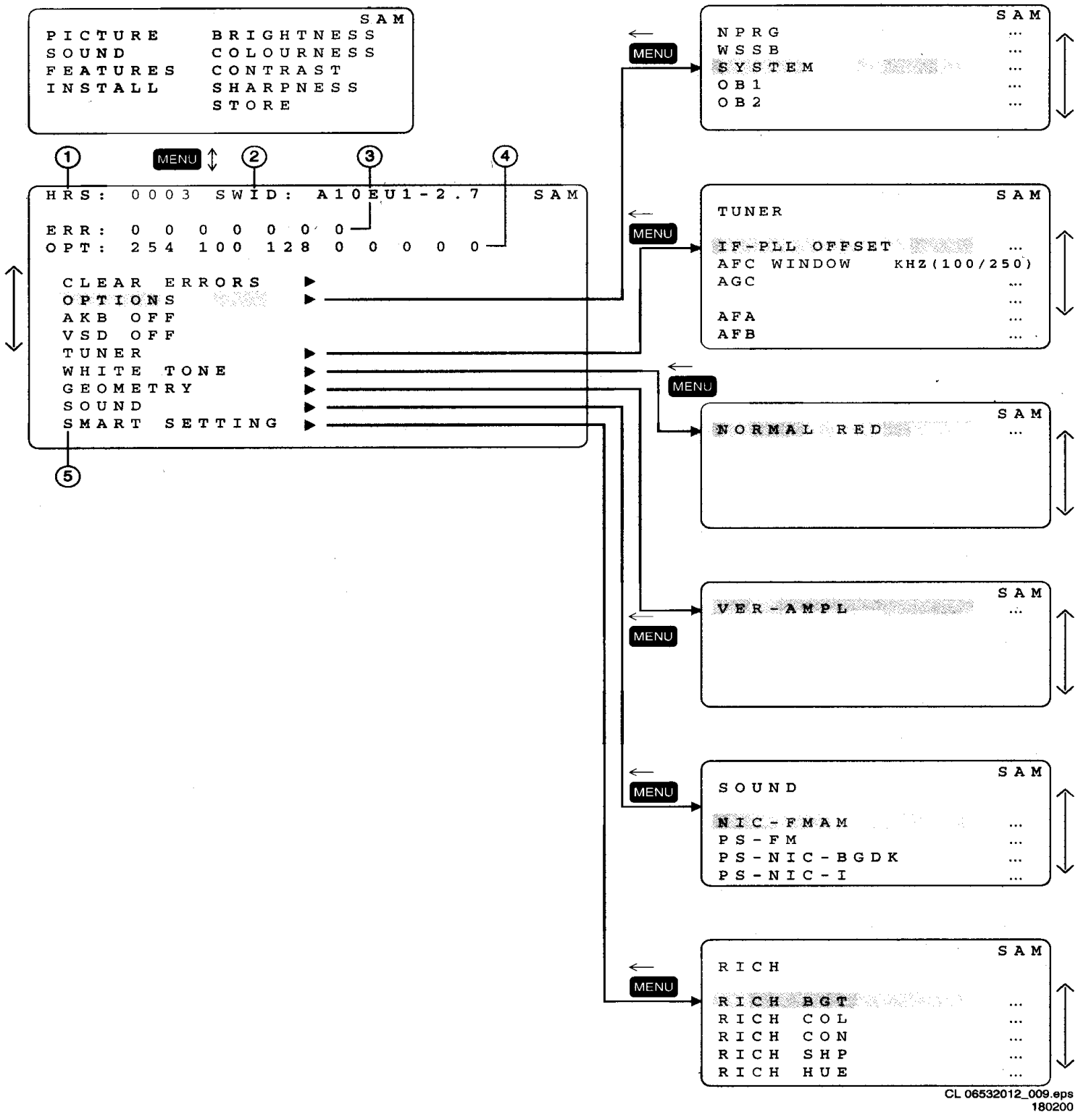


Figure 8-2 Service Alignments Mode screens and structure

8.3.1 Tuner

AGC

Set pattern generator (e.g. PM5418) with colour bar pattern and connect to aerial input with RF signal amplitude - 10mV and set frequency for PAL/SECAM to 475.25 MHz. For France select the L'-signal.

- Activate the SAM-menu. Go to the sub-menu " TUNER", select the sub-menu option AFC WINDOW and adjust the value to 100kHz.
- Select the AGC sub-menu
- Connect a DC multi-meter to pin 1 of the tuner IC 1225.
- Adjust the AGC until the voltage at pin 1 of the tuner is 1.0V +/- 0.1V.
- The value can be incremented or decremented by pressing the right/left MENU-button on the RC.
- Switch the set to standby.

Tuner options - IF PLL OFFSET and AFC WINDOW

NO ADJUSTMENTS NEEDED FOR THESE ALIGNMENTS
The default values for these options are:

- IF PLL OFFSET :
- AFC WINDOW :

8.3.2 White tone

In the white tone sub menu the colour values for the colour temperature values can be changed.
The colour temperature mode (NORMAL, DELTA COOL, DELTA WARM) or the colour (R, G, B) can be selected with the RIGHT/LEFT cursor keys. The mode or value can be changed with the UP/DOWN cursor keys.
First the values for the NORMAL colour temperature should be selected. Then the offset values for the DELTA COOL and DELTA WARM mode can be selected. Note that the alignment values are non-linear
0 represent the middle value (no offset difference)
+1 to +63 represent a positive offset (63 is the maximum positive offset)
-63 to -1 represent a negative offset (-63 is the minimum negative offset)
Negative <<< -63, -62,..., -1, 0, 1,..., 62, 63 >>> Positive (0 = no offset)

8.3.3 Geometry

The geometry alignments menu contains 13 items to align a correct picture geometry. In widescreen sets, the GEOMETRY SW is available for separate alignments of the superwide (panorama) mode. The geometry alignments are:
Initial set-up:

- Activate the SAM-menu. Go to the sub-menu "SMART SETTING" and change the setting to NATURAL.
- Exit the sub-menu "SMART SETTING" and go to sub-menu " GEOMETRY".
  - Adjust VER-SCOR to 8 for 28" WS-sets
  - Adjust VER-SCOR to 13 for 25", 28", 29" 32" and 34" picture tubes.
  - Adjust VER-SCOR to 23 for 29" SF- sets
- Vertical zoom is fixed at a default value of 25
- Vertical scroll is fixed at a default value of 32

VER-SCOR; align the vertical linearity, meaning that vertical intervals of a grid-pattern must be equal over the entire height.
Extra Alignment for 4:3 sets and Widescreen sets (Widescreen mode)

- Set Service blanking on SERV-BLK ON
- Adjust Vertical slopeVER-SLOPE xx
- Set Service blanking OFFSERV-BLKOFF

General Alignment (4:3 set, Widescreen and Superwide mode)

- Adjust Vertical amplitudeVER-AMPL xx
- Adjust Vertical shirtVER-SHIFT xx
- Adjust Horizontal shiftHOR-SHIFT xx
- Adjust Horizontal widthEW-WIDTH xx
- Adjust ParabolaEW-PARA xx
- Adjust Up cornerEW-UCORN xx
- Adjust low cornerEW-LCORN xx
- Adjust TrapeziumEW-TRAP xx
- Adjust Horizontal parrallogramEW-PARA xx
- Adjust Horizontal bowHOR-BOW xx

SERV.BLK: switch on/off the blanking of the lower half of the screen (To be used in combination with the vertical slope alignment)
VER-SLOPE; Align the vertical centre of the picture to the vertical centre of the CRT. (This is the first alignment to be performed of the vertical alignments)
VER-AMPL; align the picture height (other vertical alignments are NOT compensated)
VERSHIFT; align the vertical centre of the picture to the vertical centre of the CRT
HORSHIFT; align the horizontal centre of the picture to the horizontal centre of the CRT
EW-WIDTH; align the picture width (*)
EW PARA; align straight vertical lines at the sides of the screen (*)
EW-UCORN; align straight vertical lines in the upper corners of the screen (*)
EW-LCORN; align straight vertical lines in the lower corners of the screen (*)
EW TRAP; align straight vertical lines in the middle of the screen (*)
EW-PARA; align straight vertical lines in the top and in the bottom; vertical rotation around the centre (*)
HOR-BOW; align straight horizontal lines in the top and the bottom; horizontal rotation around the centre
Alignments indicated with (*) are not applicable for sets without East/West circuitry

8.3.4 Sound

NO ADJUSTMENTS NEEDED FOR SOUND
The default values for the audio alignments are:

- NIC-FMAM : 250 NICAM error rate threshold, the higher the more tolerance
- PS-FM: 38 Prescale for FM
- NIC BG/DK: 82 Prescale for NICAM in BG/DK system
- NIC I: 127 Prescale for NICAM in I system
- NIC L: 82 Prescale for NICAM in L system

8.4 Options

8.4.1 Options

Options are used to control the presence / absence of certain features and hardware. There are two ways to change the option settings, see Figure 2 : Service Alignments Mode screens and structure.

1. Changing a single option
   An option can be selected with the MENU UP/DOWN keys and its setting can be changed with the MENU LEFT/ RIGHT keys
2. Changing multiple options by changing option byte values
   Option bytes make it possible to set very fast all options. An option byte represents a number of different options. All options of the A10 are controlled via 7 option bytes. Select the option byte (OB1, OB2, OB3, OB4, OB5, OB6 or OB7) and key in the new value.
3. Changes in the options and option bytes settings are saved by selecting STORE and pressing the MENU RIGHT key. All changes are disregarded when the OPTION submenu is left without using the STORE command. Some changes will only take affect after the set has been switched OFF and ON with the mains switch (cold start).

8.4.2 List of options

Unless otherwise stated Y(es) means present (or ON), N(o) means not present (or OFF).

Features	Abbreviations (A10)	Description
Auto Standby with no picture	SBNP	OFF = Disabled, no automatic switch to standby
		ON = Enabled, set switches to standby after 10 minutes when no ident
Side AV Source	AV3	OFF = Disabled, side AV source not avaliable
		ON = Enabled, side AV source avaliable
Picture Setting for compress 16:9	C169	OFF=Disabled, 16:9 COMPRESS setting is not available in FORMAT menu
		ON = Enabled, 16:9 COMPRESS setting is available in FORMAT menu item
		Note 1:
Picture Setting for expand 14:9	E149	OFF= Disabled, 14:9 EXPAND setting is not available in FORMAT menu
		ON= Enabled, 14:9 EXPAND setting is available in FORMAT menu item
		Note 2:
Wide screen	WSCR	OFF= Disabled, WIDESCREEN is replaced by FORMAT
		ON = Enabled, FORMAT is replaced by WIDESCREEN
Hospitality mode	HOSP	OFF = Disabled, hospital mode cannot be entered
		ON = Enabled, hospital mode can be entered
Smart clock/Autochron	SMCK	OFF= Disabled, menu item smart clock function not available
		ON = Enabled, menu item smart clock function available
		Note 3:
Comb filter	CBFL	OFF= Disabled, no comb filter on the SSB
		ON = Enabled, comb filter on the SSB
Incredible picture	IPIX	OFF= Disabled, INCR. PICT is replaced by CONSTRAST+
		ON = Enabled, CONSTRAST+ is replaced by INCR.PICT
		Note 4:
Incredible picture via menu	IPMU	OFF = Disabled, menu item INCR. PICT not available
		ON = Enabled, menu item INCR. PICT available
		Note 5:
Dynamic Noise Reduction/Noise Reduction	DNRM	OFF=Disabled, menu item NOISE REDUCTION not available
		ON= Enabled, menu item NOISE REDUCTION available
		Note 6:
Virtual dolby	VDBY	OFF = Disabled, menu item DOLBY VIRTUAL not available
		ON = Enabled, menu item DOLBY VIRTUAL available
		Note 7:
NTSC playback hardware configuration	NTSC	OFF= Disabled, NTSC playback not possible
		ON = Enabled, NTSC playback possible
System (*)	SYSTEM	EW - Select West Europe's colour and sound system
		EE - Select East Europe's colour and sound system
		EM - Select Central Europe's colour and sound system
Favorite page	FAPG	OFF = Disabled favourite page in Teletext mode
		ON = Enabled favourite page in Teletext mode
Philips tuner	PITN	OFF = Disabled, ALPS compatible tuner is used
		ON = Enabled, Philips compatible tuner is used
Automatic Channel Installation	ACI	OFF = Disabled Automatic Channel Installation
		ON = Enabled Automatic Channel Installation
		Note 8:
Automatic Volume Leveller	AAVL	OFF=Disabled, menu item AVL not available
		ON= Enabled, menu item AVL available
		Note 9:
Automatic Tuning System	ATS	OFF= Disabled, automatic tuning system is ignored.
		ON = Enabled Automatic Tuning System,sort the program in an ascending order starting from Program 1
Program List	PLST	OFF= Disabled, the access to Program List Command is ignored
		ON = Enabled, the access to Program List Command is processed
Virgin Mode	VMOD	OFF = Disabled, cannot access virgin mode
		ON = Enabled, can access virgin mode
		Note 10:

Features	Abbreviations (A10)	Description
Smart OSD (Picture and Sound)	SOSD	OFF = Disabled, full display of OSD not available
		ON = Enabled, full display of OSD available
		Note 11:
UK Plug aNd Play	UKPNP	OFF = Disabled, cannot access Play and Play"
		ON= Enabled, can access Plug and Play"
		Note 12:
Rotation tilt	ROTI	OFF = Disabled, menu item ROTATION not available
		ON = Enabled, menu item ROTATION available
		Note 13:
SoundBoard MSP3451	SNIC	OFF = Disabled,Sound IC MSP3451 is not present
		ON = Enabled, Sound IC MSP3451 is present
Time Window	TMWIN	OFF = Disabled, Time Window is set to 2 secs.
		ON = Enabled, Time Window is set to 5 secs.
Video Mute	VMUT	OFF = Disabled, no video blanking during channel/source change
		ON = Enabled, video blanking during channel/source change
Wide Screen Signal Bit	WSSB	OFF = disable the detection of off-air transmission widescreen signal bit
		ON = to enable the detection
Dual Page Teletext	DTXT	OFF = disable dual-page teletext
		ON = to enable
Auto Picture Control	APC	OFF = disable incredible picture and DNR/NR optimisation (user control)
		ON = enable incredible picture and DNR/NR optimisation (user no control)
Electronic Program Guide	EPG	OFF = Disabled, EPG feature is not available
		ON = Enabled, EPG feature is available
Easylink communication protocol between TV/VCR	P50	OFF = Disabled, P50 feature not available
		ON = Enabled, P50 feature is available
Internal Comb Filter	INCF	OFF = disable the BOCMA internal combfilter (for demo purpose)
		ON = to enable
Max no. of Programs	NPRG	OFF = Disabled, maximum no. of program 100
		ON = Enabled, maximum no. of program is 80

8.4.3 Option bits/bytes

Option bytes for West European sets with software naming : A10ET1-x.y. This software version contains only 10 pages of TXT.
OB1 bits 8, 7, ..., 1: SBNP, C169, E149, HOSP, SMCK, AV3, WSCR, CBFL
OB2 bits 8, 7, ..., 1: IPIX, IPMU, NTSC, PITN, ACI, ATS, PLST, VMOD
OB3 bits 8, 7, ..., 1: SOSD, FAPG, UKPNP, DNRM, VMUT, AAVL, ROTI, SNIC
OB4 bits 8, 7, ..., 1: TMWIN, NPRG, WSSB, INCF, (res), (res), (res), (res)
OB5 bits 8, 7, ..., 1: (RESERVED)
OB6 bits 8, 7, ..., 1: (RESERVED)
OB7 bits 8, 7, ..., 1: (RESERVED)
OB8 bits 8, 7, ..., 1: (res), (res), (res), (res), (res), (res), SYSTEM, SYSTEM
Option bytes for West European sets with software naming : A10EP1-x.y. This software version contains 100 pages of TXT.
OB1 bits 8, 7, ..., 1: SBNP, C169, E149, HOSP, SMCK, AV3, WSCR, CBFL
OB2 bits 8, 7, ..., 1: IPIX, IPMU, NTSC, VDBY, EPG, P50, PITN, ACI
OB3 bits 8, 7, ..., 1: ATS, PLST, VMOD, SOSD, FAPG, UKPNP, DTXT, DNRM
OB4 bits 8, 7, ..., 1: VMUT, AAVL, ROTI, SNIC, TMWIN, NPRG, WSSB, INCF
OB5 bits 8, 7, ..., 1: APC, (res), (res), (res), (res), (res), (res), (res)
OB6 bits 8, 7, ..., 1: (RESERVED)
OB7 bits 8, 7, ..., 1: (RESERVED)
OB8 bits 8, 7, ..., 1: (res), (res), (res), (res), (res), (res), SYSTEM, SYSTEM

An option byte value is calculated in the following way:
value “option bit 1” x 1 =
value “option bit 2” x 2 =
value “option bit 3” x 4 =
value “option bit 4” x 8 =
value “option bit 5” x 16 =
value “option bit 6” x 32 =
value “option bit 7” x 64 =
value “option bit 8” x 128 =
Total : value “option byte” =

9. Circuit descriptions and abbreviation list

9.1 Circuit descriptions

The following circuits are described:

1. Introduction
2. Block diagram
3. Power supply (see A8 TM: 4822 727 21613)
4. Control
5. Tuner & IF
6. Video processing
7. Synchronisation
8. Horizontal deflection (see A8 TM: 4822 727 21613)
9. Vertical deflection (see A8 TM: 4822 727 21613)
10. Audio processing
11. OSD / Teletext / NexTView
12. CRT / SCAVEM / Rotation

9.1.1 Introduction

The A10E is the successor of the A8-chassis. A10 is the chassis name, E stands for Europe.
Where the A8 used a lot of different panels, the A10 architecture consist of 1 conventional large signal panel (LSP) and a small signal board (SSB) module, placed into a so called SIMM-connector (Standard Interface, 80 pins):

- The LSP is built up very conventional, with hardly any surface mounted components on the copper side. It incorporates the Power Supply, the Deflection, the Tuner, the I/O and the Audio Amplifier circuits.
- The SSB is a high tech module (2 sides reflow technology, full SMC) with very high component density. Despite this, it is designed in such a way, that repair on component level will be possible. To achieve this extensive diagnostic possibilities are provided via Service Modes and/or ComPair. The SSB incorporates the IF-, Video/Audio-processing, Control and OSD/TXT circuits.

Due to the low amount of cabling etc., expectation is that the FCR will be low.

In this 'circuit description' chapter, sometimes will be referred to the Training Manual of the A8 (4822 727 21613). This is done for the following circuits: the Power supply, the Horizontal (Line) Deflection and the Vertical (Frame) deflection parts. The electrical principle of these circuits is also applicable on the A10.

9.1.2 Block diagram

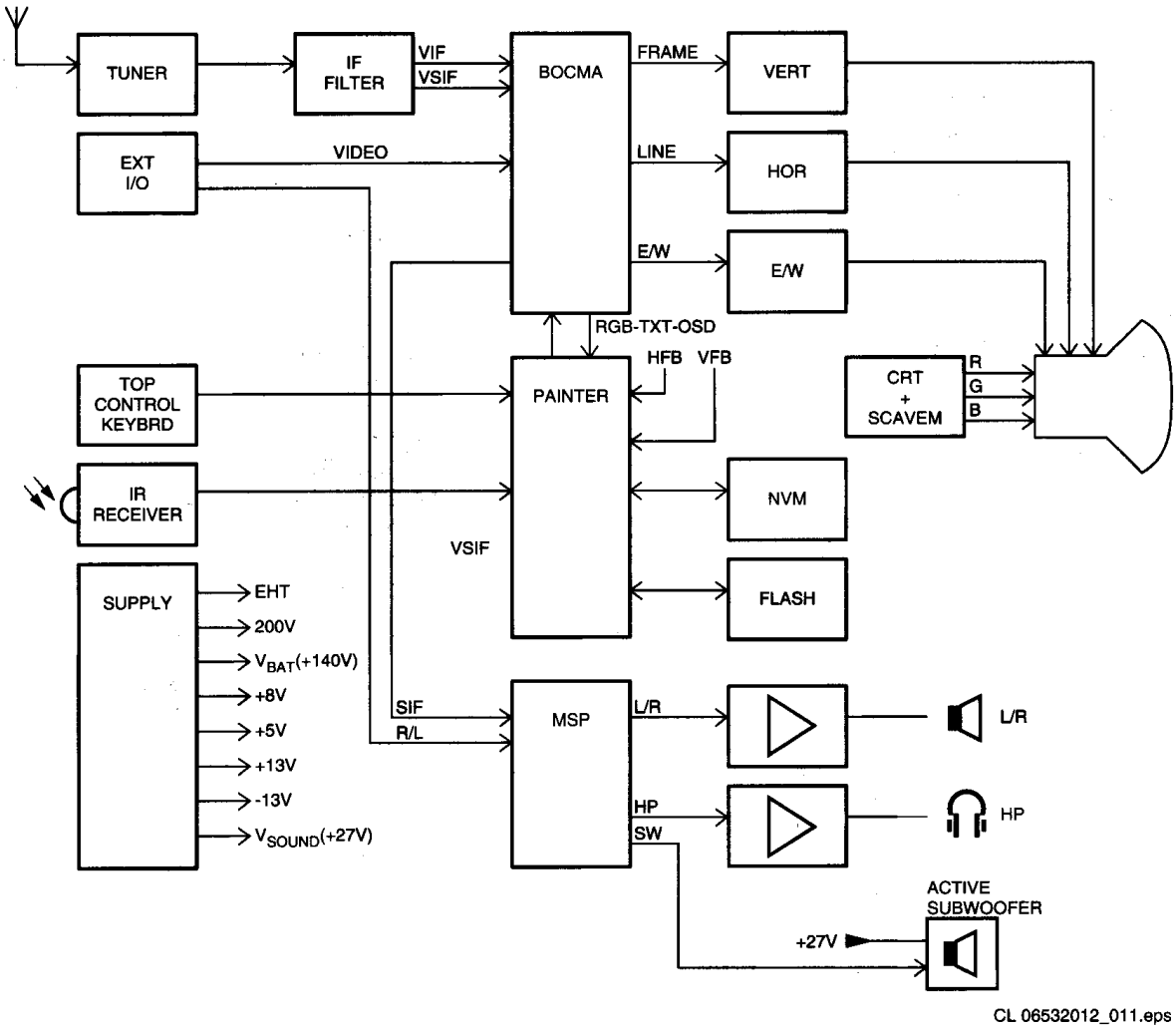


Figure 9-1

The tuner type UV1316 is a PLL tuner and delivers the IF-signal, via audio & video SAW-filters, to the Multi-system TV processor (TDA888x, IC7301 also called BOCMA), which has the following functions:

- Multi-system decoder.
- Video source- and record select.
- Colour decoder.
- RGB output.
- Sound demodulator.
- Geometry control.
- Picture improvement.
- Synchronisation.

The BOCMA has 1 input for the internal CVBS signal and 2 inputs for external CVBS or Y signals. It has only one Chroma input so that it is not possible to apply 2 separate Y/C inputs. The selection is made via the I^2C-bus.
It has 2 independently switchable CVBS outputs for e.g. TXT, Comb-filter, CVBS-monitor or PIP (optional).
Two SCART-connectors are used: SCART1 is fully equipped and SCART2 is meant for VCR. Pin 10 of SCART2 is used for Easylink and there is a possibility for Y/C in. The CVBS-out on pin 19 can be used for WYSIWYR (What You See Is What You Record).

Internal video processing is done in the BOCMA with YUV-signals. It also handles the video control, geometry part and the insertion of the TXT/OSD RGB-signals. The video part delivers the RGB signals to the CRT-panel and the geometry part delivers the H-drive, V-drive (differential output), E/W-drive.

Both deflection circuits are located on the LSP and are driven by the BOCMA. The horizontal output stage generates also some supply voltages and the EHT-, focus- and Vg2-voltages.

The RGB amplifiers on the CRT-panel are integrated in one IC (TDA6107Q) and are supplied with 200 V from the LOT. The SCAVEM circuit modulates transitions of the Luminance (Y) signal on the horizontal deflection current, giving a sharper picture.

The sound part is built up around the MSP34xx (Multi-channel Sound Processor) for IF sound detection, sound control and source selection. Dolby decoding is also done by the MSP. Amplification is done via an integrated power amplifier IC, the AN5277.

The microprocessor, called Painter (SAA55XX, IC7064), takes care of the set control, error generation and analogue TXT/ OSD input- and output processing.
The Painter, ROM and RAM are supplied with 3.3 V, which is also present during STANDBY.
The NVM (Non Volatile Memory) is used to store the settings, the flash-RAM contains the set software and the DRAM (located inside the µP) is capable for storing 10 Teletext pages.

The power supply is a Switch Mode Power Supply (SMPS) with minimum voltage switch. It is a flyback converter with primary current sensing, secondary voltage sensing and mains input measuring. It is built around IC7921 (which has a built-in MOSFET and control circuit) and generates a.o. the 140 V (V-BAT) and the 27 V (for the audio part).
During Standby, the power supply is switched to a 'low power burst mode' via TS7946 and the following burst mode generator, in order to reduce the power consumption.
A relay is used to switch the degaussing circuit for several seconds during switching 'ON' of the set.

9.1.3 Power supply (diagram A1)

For circuit description see A8 Training Manual: 4822 727 21613.

Differences with the A8 are:

- Item-numbers are different from the one mentioned in the text.
- Degaussing cicrcuit
- Output voltages

Degaussing circuit (diagram A1: section A1 - D3)
The degaussing circuit is activated whenever the TV set is turned on. So from normal 'off' to 'on' and from 'stand-by' to 'on' the degaussing circuit is activated. During start-up the signal LIGHT_SENSOR_VDEGAUS (A4-1) is low. After start-up of the µP this becomes high for 2 seconds which forces TS7932 in conduction. Now the coil of the relay is activated and switch 1931 is closed. The mains voltage is now connected to the degaussing coil. The degaussing current passes through the degaussing coil and through PTC 3911 and PTC 3912 which limit the inrush-current.
After these 2 seconds, the signal LIGHT_SENSOR_VDEGAUS goes low, 7900 turns off, the coil of relay 1931 is de-energised and the 220 Vac is disconnected from the degaussing coil. During normal operation, no current passes through the degaussing coil due to the fact that switch 1931 is opened.

Output voltages

- +8V_UNREG (Input voltage for stabiliser 7942 and supply voltage for the circuit to activate the degausssing coil) : +13.5 V. If +14 V and +8 V are not present check 1905.
- +33V (For Tuner at Mono-carrier and PIP-panel) : +33 V. Created via R3409 and zenerdiode 6481
- Vbat (Battery Voltage for Line Output Stage) : +140 V
- +8V (BOCMA Supply, Scart, Video at SSB) : +8.3 V. Output voltage from stabiliser 7942. This voltage is decreased in standby to 2.3 V. In standby TS7944 is conducting and switching R3945 parallel to R3942 and R3947.
- +5V_STBY : +5.1 V. This voltage is also present during standby. If this voltage and +5V are missing check Fuse 1961. If the voltage at pin 2 and 5 of IC7968 are present replace 7907.
- +5V (For Tuner, NV_CLOCK, Video at SSB, PIP-panel): +5.1 V. This voltage is disabled when the +13V-VERT is not present at pin 2 of IC7967. +13V -VERT is generated by the line-output circuit. So when the line-output circuit is working correctly the +5V is enabled to start the set.
- +27V (Audio Supply) : +27 V. If this voltage is missing check D6971/6972 and/or sound-amplifier IC7702.
- 3V3_STBY (µP Supply, NVM, BOCMA supply, Receiver LED): This voltage is also present during standby. If this voltage is missing check NFR 3964.

9.1.4 Control (diagram C4)

Micro-processor
The microprocessor (SAA55XX, IC7064 called Painter) provides:

- Control functions for the TV-set.
- On Screen Display (OSD).
- Teletext functions.
- P50 (Easylink) communication.
- I/O-ports for I^2C, RC5, LED, and service modes.
- Error code generation.

For 10 pages TXT-data can be stored internally.
The Non Volatile Memory IC7066 is a 4 kB version M24C32W6.

All ICs in this part are supplied with 3V3 that is also present during Standby. For this voltage a zenerdiode is used (D6966).

For stable OSD and TXT, the display is synchronised to the TV signal processing device by way of horizontal and vertical sync

signals provided by external circuits (HFB and VFB). From these signals all display timings are derived.
The OSD/TXT RGB-outputs (46/47/48) and fastblanking (52) are fed to the BOCMA (pins 35 - 38).

Pin	Signal	Function
1	TILT	Generates drive signal for rotation circuit
2	SEL_SVHS_RR_STATUS2	Selects Y/C source from Side or Rear I/O and detects presence of EXT2 (CVBS) / 4:3 or 16:9
4	STATUS1_PIP-AFT_PIP-50-60HZ	Detects presence of EXT1 (CVBS) / 4:3 or 16:9
5	KEYBOARD	Input line from Top Control keyboard
6	FRONT_DETECT	Detects presence of Headphone at FRONT
13	STAND-BY	To switch between Standby and Normal operation
16	SEL_MAIN_FRNT_RR	Selects main video source from Rear or Front
17	COMM_LINE	P50 in/output (Easylink)
18	LIGHT-SENSOR_VDEGAUSS	Activates the degaussing relay at switch on
24	SYS1	Selects Combfilter
25	SYS2	Selects Combfilter
28	ON_OFF_LED	LED driver output
31	CVBS2OUT	CVBS input for TXT data
32	G_SC1-IN_Y-IN	
46	B_TXT_OSD	Blue output for OSD/TXT
47	G_TXT_OSD	Green output for OSD/TXT
48	R_TXT_OSD	Red output for OSD/TXT
52	FBL_TXT_OSD	Fast blanking output for TXT and OSD
52	FBL_SCAVEM	Fast blanking output for SCAVEM
53	HFB	H-sync input for stable OSD/TXT
54	SEL_MAIN_R1R2	Selects main video source from EXT1 or EXT2
55	VFB	V-sync input for stable OSD/TXT
59	SEL_IF_LL	Switches the appropriate SAW filter for LL'
70	CLOCK12MHZ	Clock output for external IC's
76	RC5	Input line from Remote Control
81	SCL	Clock output of master I²C bus
82	SDA	Data in/out of master I²C bus
83	SCL_2	Clock output of NVM I²C bus
84	SDA_2	Data in/out of NVM I²C bus
93	AGCuP	
96	HIS_OFF	To activate the optional Histogram IC TDA9171
98	SOUND_ENABLE	Mutes the audio amplifier
100	PANORAMA	Activates 16:9 feature

I²C-busses
In the A10E-chassis with Painter-processor there are two I²C-busses used:
- Hardware I²C-bus, used for all IC communication.
- Separate short bus for the Non Volatile Memory (NVM), to avoid data corruption.

NVM
The Non Volatile Memory IC7066 contains all set related data that must be kept permanently, such as:
- Software identification.
- Operational hours.
- Error-codes.
- Option codes.
- All factory alignments.
- Last Status items for the customer + a complete factory recall.

9.1.5 Tuner & IF (diagram A4, C1 & C3)

Tuner
The tuner UV1316 is I²C-controlled and is capable of receiving off-air, S- (cable) and Hyperband channels:
- Low 44.25 - 157.25 MHz
- Mid 157.25 - 442.5 MHz
- High 142.5 - 890.0 MHz

Tuning is done via I²C. The reference voltage on pin 9 is 33 V. This voltage is derived from the V-BAT via a resistor of 68 kΩ and a zenerdiode.

Video IF amplifier
The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1451 or 1454 in case of system L/L') and one for IF-audio (1455). The type of these filters is depending of the standard(s) that has to be received.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 7 of the BOCMA to pin 1 of the tuner. The AGC-detector operates on top sync and top white level. AGC take-over point is adjusted via the service alignment mode 'Tuner' - 'AGC'. If there is too much noise in the picture, then it could be that the AGC setting is wrong. The AGC-setting could also be mis-aligned if the picture deforms with perfect signal; the IF-amplifier amplifies too much.

An (alignment free) PLL carrier regenerator with an internal VCO demodulates the video signal. This VCO is calibrated by means of a digital control circuit, which uses the clock frequency of the µP as a reference. The frequency setting for the various standards (33.4, 33.9, 38.0, 38.9, 45.75 and 58.75 MHz) is realised via the I²C-bus.
The AFC output is generated by the digital control circuit of the IF-PLL demodulator and can be read via the I²C-bus.

The video identification circuit is used to identify the selected CBVS or Y/C signal.
The IC contains a group delay correction circuit, which can be switched between the BG and a flat group delay response characteristic. This has the advantage that in multi-standard receivers no compromise has to be made for the choice of the SAW filter. Also the sound trap is integrated. The centre frequency of the trap can be switched via the I²C-bus. The signal is available on pin 27.

QSS sound circuit
The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the intercarrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved.

The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics. The AM signal is supplied to the output (pin 27) via the volume control.

9.1.6 Video processing (diagram C2 & C3)

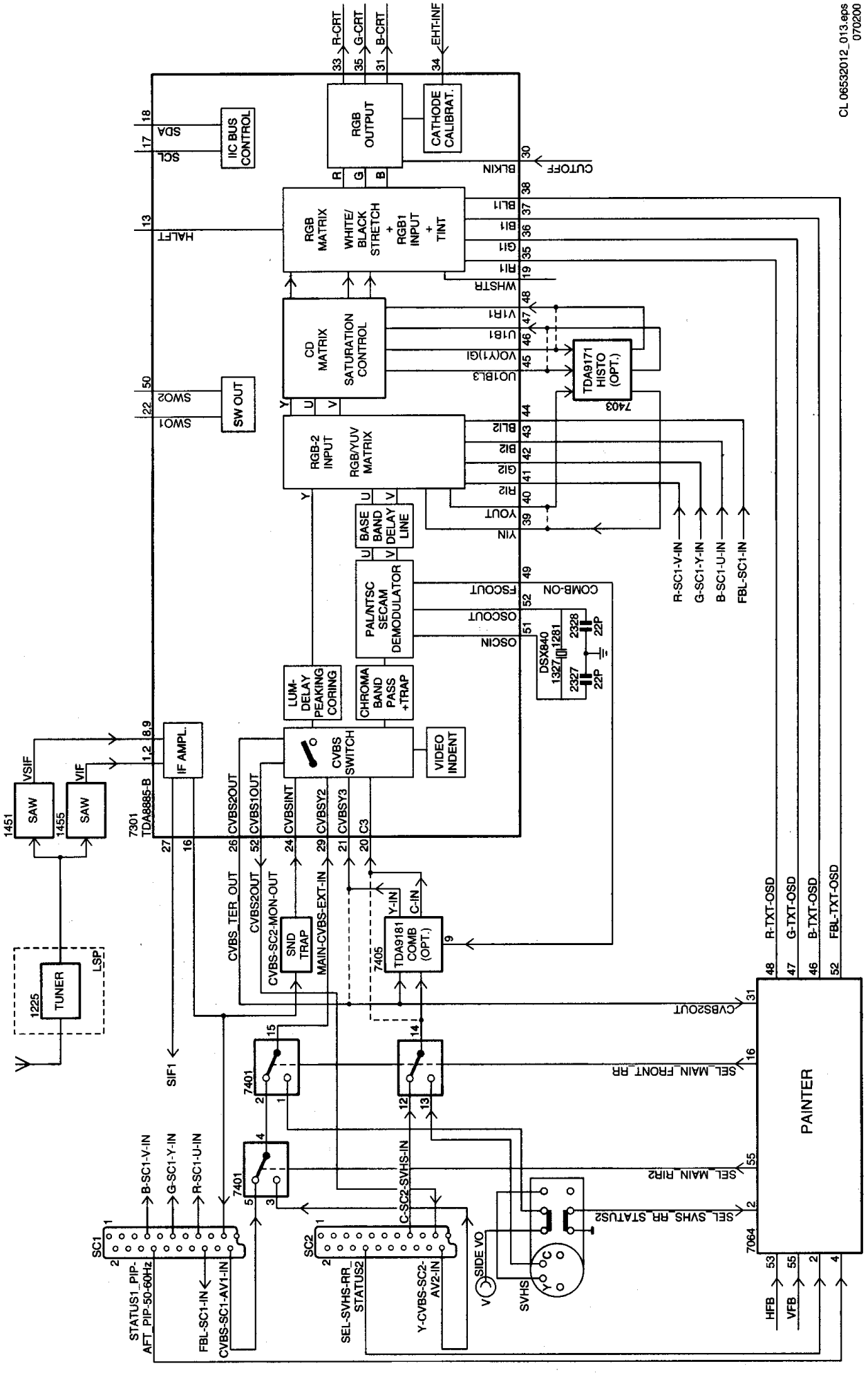


Figure 9-2

Introduction

The video processing is completely handled by a one-chip video processor the TDA888X. This IC contains:

- IF demodulator.
- Chrominance decoder
- Sync separator.
- Horizontal & vertical drive.
- RGB processing.
- CVBS and SVHS source select.

It has also build in features like:

- CTI.
- Black stretch.
- Blue stretch.
- White stretch.
- Slow start up.
- Dynamic skin tone correction etc.

Further, and this is different with the used TDA884x in the A8, it also incorporates sound IF traps and filters, and requires only one crystal for all systems.

Source selection

The BOCMA has an input for the internal CVBS signal and 2 inputs for external CVBS or Y signals. The circuit has only 1 chroma input so that it is not possible to apply 2 separate Y/C inputs.
The selection of the various sources is made via the I^2C-bus.
The used IC version has 2 independently switchable outputs:

- The CVBS1 output (pin 54) is identical to the selected signal that is supplied to the internal video processing circuit and is used as source signal for the teletext decoder (Painter). Both CVBS outputs have an amplitude of 2.0 V-PP.
- The CVBS2 output (pin 26) is fed to pin 19 of SCART2 for WYSIWYR (What You See Is What You Record).

If the Y/C-3 signal is selected for one of the outputs, the luminance and chrominance signals are added so that a CVBS signal is obtained again.

The I/O is divided over two parts: Rear I/O and Side I/O. The rear has 2 SCART inputs, the side has only one SVHS input. The I/O signals are routed via the LSP to the SSB panel.

EXT1: The input of SCART1 is CVBS + RGB + L/R and the output is the video (+ sound) signal from the tuner (CVBS_TER_OUT).

EXT2: The input of SCART2 is Y/C + CVBS + L/R. The output signal is CVBS_SC2_MON_OUT (+ sound).
SCART2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB: it has the possibility for Y/C_in and Easylink-Plus (P50): Y_in on pin 20 and Chroma_in on pin 15. Easylink is handled via pin 10 of the SCART2 (this is a bi-directional communication with the µP) and supports the next features:

- Signal quality and aspect ratio matching
- One touch play & text
- PIP
- Pre-set download
- WYSIWYR
- Automatic Standby
- Country and language installation
- System Standby
- Intelligent set top box features
- NexTView download
- Timer record control
- VCR control feature

The selection of the external I/O's is controlled by the µP (pins 16 & 55) and handled via IC7401:

- SEL-MAIN-R1R2 is the selection between SCART1 (R1) and SCART2 (R2).
- SEL-FRNT-RR selection is made between Side and Rear I/O.

The status signals (SCART pin 8) and also Front detection is fed to the Painter (pins 2, 4 and 6).

Combfilter

After the selection of the external signals (EXT1, EXT2 or Side I/O) is made, the Y/CVBS signal is fed to the TDA888X (pin 29) along with the Front-end signal (pin 24). The selection between the 2 is made in the BOCMA and the output (pin 26) is fed to the (optional) Comb Filter, whose output is again fed to the BOCMA (pin 21) for further processing. The external colour signals are also fed to the Comb filter. In SVHS mode the Comb filter is bypassed and the external signals are directly fed to the BOCMA.
Switching the Comb filter is done via pen 49 of IC7301. Video standard selection is done via the SYS1 and SYS2 signals from the microprocessor.
If the Combfilter is not used then the jumpers (4472 diagram C3) is present and the external Y/C signals are directly fed to the pins 20, 21 of IC7301.

After this stage we add the external RGB signals (from SCART) to pins 40 - 44.

Histogram (YUV picture improvement) IC

The demodulated video-signal can be checked on pins 40, 45 and 46 of IC7301 and is fed to pins 39, 47 and 48. In this path the Histogram IC TDA9171 can be inserted. Without this IC, the jumpers 4436 & 4433 (Y), 4434 & 4432 (U) and 4435 & 4431 (V) are used.
This TDA9178 can control various picture improvements: histogram processing, colour transient improvement and luminance transient improvement.

- Sets without TDA9178; for sets without TDA9178, the Dynamic Skin Tone Control, Blue Stretch and Green Enhancement are controlled by the BOCMA.
- Sets with TDA9178: for sets with TDA9178 the Dynamic Skin Tone Control and Green Enhancement are controlled in the TDA9178. The Blue Stretch is controlled by the BOCMA and the Blue Stretch of the TDA9178 is switched off.

When the TDA9178 is used, noise reduction is also available. The action of the noise reduction has also influence on the sharpness control: if a noisy signal is received then the noise reduction should be high and sharpness low and also vice versa.

Protections

Overvoltage conditions (X-ray protection) can be detected via the EHT tracking pin (pin 3). When an overvoltage condition is detected the horizontal output drive signal will be switched-off via the slow stop procedure but it is also possible that the drive is not switched-off and that just a protection indication is given in the I^2C-bus.
This pin can also be used to switch off the TV-receiver in a correct way when it is switched off via the mains switch or when the power supply is interrupted by pulling the mains plug. It is possible to place the vertical deflection in an overscan position.

The IC has a second protection input on pin 58 used as 'flash' protection. When this input is activated the horizontal drive signal is switched-off immediately and switched-on again via the slow start procedure.

Chroma and Luminance processing

The circuit contains a chroma bandpass and trap circuit (including a luminance delay line and the delay for the peaking circuit). The centre frequency of the chroma bandpass filter is switchable via the I^2C-bus so that the performance can be optimised for 'front-end' signals and external CVBS signals.

Colour decoder

The colour decoder can decode PAL, NTSC and SECAM signals. The internal clock signals for the various colour standards are generated by means of an internal VCO, which uses the 12 MHz crystal frequency as a reference.
Under bad-signal conditions (e.g. VCR-playback), it may occur that the colour killer is activated although the colour PLL is still in lock. When this killing action is not wanted it is possible to overrule it.
The IC contains an Automatic Colour Limiting (ACL) circuit which is switchable via the I^2C-bus and which prevents that oversaturation occurs when signals with a high chroma-to-burst ratio are received.
The reference frequency of the colour decoder is fed to the Fsc output (pin 49) and can be used to tune an external comb filter.
The base-band delay line is integrated. The demodulated colour difference signals are internally supplied to the delay line. The colour difference matrix switches automatically between PAL/SECAM and NTSC.

Picture improvement features

In the BOCMA various picture improvement features have been integrated. These features are:

- Video dependent coring in the peaking circuit. The coring can be activated only in the low-light parts of the screen. This effectively reduces noise while having maximum peaking in the bright parts of the picture.
- Colour Transient Improvement (CTI). This circuit improves the rise and fall times of the colour difference signals.
- Black-stretch. This circuit corrects the black level for incoming video signals, which have a deviation between the black level and the blanking, level (back porch).
- Blue-stretch. This circuit is intended to shift colour near 'white' with sufficient contrast values towards more blue to obtain a brighter impression of the picture
- White-stretch. This function adapts the transfer characteristic of the luminance amplifier in a non-linear way dependent on the picture content. The system operates such that maximum stretching is obtained when signals with a low video level are received. For bright pictures the stretching is not active.
- Dynamic skin tone (flesh) control. This function is realised in the YUV domain by detecting the colours near to the skin tone. The correction angle can be controlled via the I^2C-bus.

RGB output

The IC's have a flexible control circuit for RGB and YUV input signals which has the following features:

- Input which can be used for YUV or RGB input signals and as YUV interface. The selection of the various modes can be realised via the I^2C-bus. For the YUV input 2 different input signal conditions can be chosen It is also possible to connect the synchronisation circuit to the incoming Y input signal. This input signal can be controlled on saturation, contrast and brightness.
- The RGB-1 input which is intended for OSD/text signals and which can be controlled on contrast and brightness. By means of software the insertion blanking can be switched on or off. It is also possible to convert the incoming RGB-1 signal to a YUV signal. The resulting signal is supplied to the YUV outputs.
- The TDA888X versions have an additional YUV or RGB input which can be controlled on contrast, saturation and brightness. This signal is supplied to the control circuit via the YUV interface so that an external picture improvement IC will also have effect on this signal.

Geometry control

The deflection processor of the TDA888X series offers several control parameters for picture alignment:

- S-correction
- vertical amplitude
- vertical slope
- vertical shift
- vertical zoom
- vertical scroll

for vertical picture alignment, and

- horizontal shift.
- EW width with extended range because of the "zoom" function
- EW parabola width
- EW upper/lower corner parabola
- EW trapezium correction.
- horizontal parallelogram and bow correction

for the horizontal picture alignment.
The IC is designed for use with a DC-coupled vertical deflection stage. This is the reason why a vertical linearity alignment is not necessary (and therefore not available).
All geometry control is done via I^2C and the data is stored in the NVM (IC7066) of the SSB.

Cut-off control / white drive

The picture tube is continuously adjusted to prevent visible ageing of the picture tube. In this way the customer has always a perfect picture. This is so-called 'Continuous Cathode Calibration'. The function is realised by means of 2-point black level stabilisation. By inserting two levels for each gun and comparing the result with 2 different reference circuits the drive is controlled. With two different reference currents the influence of picture tube parameters like the spread in cut-off voltage can be eliminated.
The measurement of the 'high' and the 'low' current of the 2-point stabilisation circuit is carried out in 2 consecutive fields. The leakage current is measured in each field, The maximum allowable leakage current is 100 A. The current is measured via Black Current Input (BLKIN) that is fed back to pin 30 of IC7301.
When the TV is switched-on the RGB output signals are blanked and the black current loop will try to set the right picture tube bias levels and then there is RGB-drive.

Peak White Limiting

If the beam current becomes too high, the picture tube could be damaged. The control circuit contains a Peak White Limiting circuit (pin 34): if the beam current increases, the EHT-info voltage will decrease. Now the contrast will be reduced. The peak white level is adjustable via the I^2C-bus.
The circuit also contains a soft-clipper, which prevents that the high frequency peaks in the output signal become too high. The difference between the PWL level and the soft clipping level is adjustable via the I^2C-bus in a few steps.

Switch-off control

During switch-off of the TV receiver a fixed beam current is generated by the black current control circuit. This current ensures that the picture tube capacitance is discharged. During the switch-off period the vertical deflection is placed in an overscan position so that the discharge is not visible on the screen.

9.1.7 Synchronisation (diagram C1)

Horizontal synchronisation

Before the video processor IC7301 can generate horizontal drive pulses, the supply voltages on both pins 23 and 53 must be present. After the start-up command of the µP (via the I^2C) the BOCMA starts giving horizontal pulses.
To obtain a smooth switch-on/off behaviour the horizontal drive signal is switched-on/off via the soft-start/soft-stop procedure. This function is realised by means of a variation of the T-ON of the horizontal drive pulse. When the soft-start procedure is completed the horizontal output is gated with the flyback pulse

so that the horizontal output transistor cannot be switched-on during the flyback time.

An additional function of the IC is the 'low-power start-up' feature. For this function a supply voltage with a value between 3 and 5 V must be available at the start-up pin (required current 5 mA typical).
In this condition the horizontal drive signal has the nominal T-OFF and the T-ON grows gradually from zero to the nominal value as indicated in the soft-start behaviour. As soon as the 8 V supply is present, the switch-on procedure (e.g. closing of the second loop) is continued.

The horizontal drive signal is generated by an internal VCO, which is running at a frequency of 25 MHz. This oscillator is stabilised to that frequency by using the 12 MHz frequency of the crystal oscillator as a reference. The horizontal sawtooth oscillator signal is converted into a square wave voltage. This square wave LINEDRIVE1 signal at pin 56 is fed to the line output stage. The time constant of the sync. circuit (different for VCR and weak terrestrial signals) is automatically internally determined by the BOCMA.

On pin 57 of IC7301 the sandcastle pulse (SC) is available. This is a 2-state pulse that is used for the synchronisation of the (optional) IC's 7405 and 7403.

The dynamic phase-correction signal at pin 58 of IC7301 gives horizontal shift corrections during beam current changes. If the beam current increases (more white), the EHT voltage decreases so the picture will become off-centre. This signal takes care that the picture remains in the middle of the screen by adapting the timing of the horizontal drive pulse (LINEDRIVE1).

Vertical synchronisation
The vertical sawtooth generator drives the vertical output drive circuit. On pins 63 & 64 are 2 differential voltages FRAMEDRIVE+ and FRAMEDRIVE-. These create differential currents, which are fed to the vertical output stage. Via the I^2C-bus adjustments can be made of the horizontal and vertical geometry. t.

E/W correction
The EW_DRIVE signal at pin 62 takes care for the correct pin-cushion correction for 110° tubes. It also corrects breathing of the picture due to beam current variations (EHT varies dependent of the beam current: e.g. for widescreen without load this is 31.5 kV and with load (1.5 mA) 29.5 kV). This correction is derived from the signal on pin 34 (EHT_INFO) which "measures" the beam-current. This signal has two functions:
- To correct the pin-cushion due to beam current variations.
- As protection signal. As the beam current is too high (voltage on pin 34 > 3. 5 V) the set is forced into protection.

9.1.8 Horizontal (line) deflection (diagram A2)

For circuit description see A8 Training Manual: 4822 727 21613.

Differences with the A8 are:
- Item-numbers are different from the one mentioned in the text.
- Addditional Panorama circuit
- Output voltages: absense of the +30 V for the East-West protection.

9.1.9 Vertical (frame) deflection (diagram A3)

For circuit description see A8 Training Manual: 4822 727 21613.

Differences with the A8 are:
- Item-numbers are different from the one mentioned in the text.
- Additional protection circuit "Prot E-W" has been removed.

9.1.10 Audio processing (diagram C6 & A6)

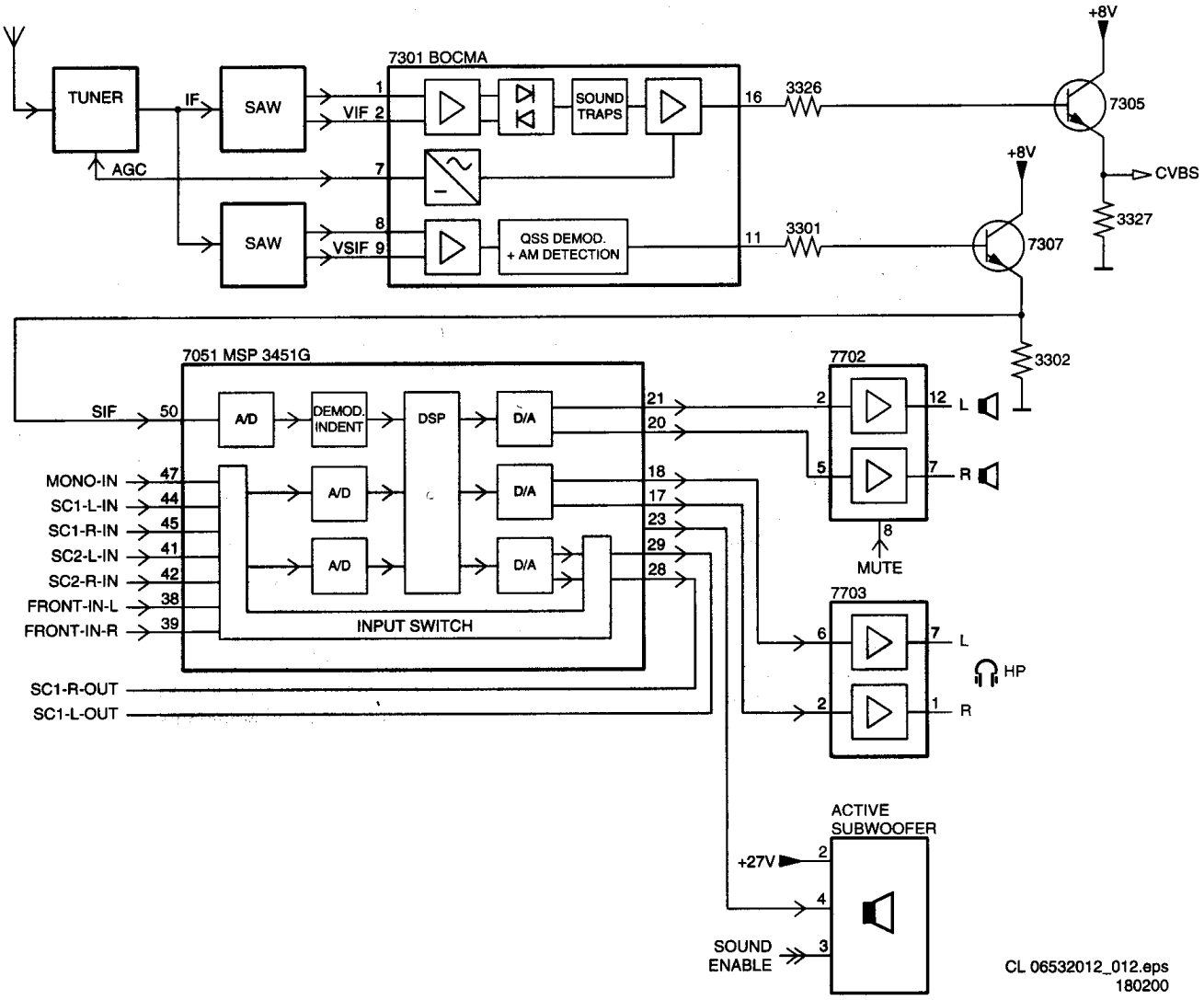


Figure 9-3

Introduction

The following systems are available:

- Basic : FM/AM mono (all standards).
- NICAM : FM stereo / NICAM B/G, D/K, I, L/L'.
- 2CS : FM stereo / dual language (all standards 4.5, 5.5, 6.5 MHz).

All A10E sets contain one of ITT's Multistandard Sound Processing IC's for sound decoding:

- MSP3415D: Europe & AP decoding, Stereo incl. NICAM.
- MSP3451G: Global decoding, Virtual Dolby.

This IC takes care of the main FM, AM and NICAM sound decoding.
The analogue input and output sections of MSP offer wide range of switching facilities such that it is possible to distribute all possible source signals (internal and external) to the desired output channels (main, headphone or SCART outputs).
All MSP versions contain digital audio processing, used for the basic left/right stereo sound, such as bass, treble, balance, incredible sound and spatial and source selection (SIF-signal, EXT1 or EXT2).
In addition to that, the MSP3451 is also able to perform Virtual Dolby, a Dolby approved sound mode for surround sound reproduction with left/right speakers only.

Basic

The MSP is used as sound decoder in all cases of transmission.

NICAM

This high quality digital audio format is used in Eastern Europe, Belgium, France, and UK, while NICAM LL' is being used in France.
The IF output from the tuner is filtered by SAW filters. AM sound is directly demodulated from the SIF. The L/L' switching is done for the BOCMA and also on the SAW filter to select the appropriate filter (SEL_IF_LL signal from µP). The SIF from the BOCMA (pin 11) passes through the high pass filter and amplifier into the MSP input (pin 50) for further demodulation.

2CS

This analogue FM stereo audio standard is predominately used in Germany and The Netherlands. It is also used on some cable television networks.
The SIF from the BOCMA is available at its CVBS output (pin 11) and passes through the high pass filter and amplifier and fed into the MSP input (pin 50) for further demodulation.
Signals of all standards of 2CS and MONO are demodulated by MSP.

Source selection

- MSP3515D (stereo)

This IC is an economised version of the MSP3410 that is used in the MG-chassis. It can cover 2 stereo and 1 mono (AM) input. Since more inputs are required, separate source selectors are used (HEF4052, IC7650 and HEF4053, IC7630). This selector has EXT1, EXT2, FRONT and SC1-OUT (Tuner) as input and is connected to the SCART1 input of the MSP3415. The SCART2 input is not used.

Since the MSP3415 has only one SCART output, which is connected to the SCART1, a constant level output and connection to SCART2 is not available. This is fixed by connecting the HEF4052 input selector to the constant level output and to SCART2.

To get a constant level output if the Tuner is selected, the SCART1 output (Tuner at any time), has to be fed back to the input selector and selected as input for the MSP (SCART1 input).

The MSP3415 has no separate output to drive a headphone. Therefore the speaker outputs are hardwired (on the LSP) to the headphone amplifier.

- MSP3451G (Virtual Dolby)

The MSP3451, which is used in all versions supporting Virtual Dolby, is capable of supporting 4 stereo inputs and 1 mono (AM) input. Therefore the extra input selector (HEF4052) is not needed.

The MSP3451 is also capable of supporting 2 SCART outputs, so the trick used in the MSP3415 set-up to get a constant level output is not needed.

The MSP3451 has a separate headphone output, so sound control be done separate from the speakers.

Audio decoding

At the input a choice can be made between two IF-signals; SIF and SIFM.
The selected signal is fed to the AGC. After this, an ADC converts the IF-signal to digital.
This digital signal can be processed by 2 demodulation channels. The first one is able to handle FM and NICAM signals. The second one can handle FM and AM signals.
Each channel contains a mixer to shift the incoming signal in the frequency domain. This shift is determined by the value of a DCO (Digital Controlled Oscillator).
After the down-mix, the signal is fed, via a filter, to a discriminator. From here the AM, FM or NICAM demodulation can be performed.
Both channels contain an 'automatic carrier mute' function, which automatically mutes the output of the analogue section when no carrier is detected.
After demodulation, the FM-signals are subjected to a de-emphasis operation. After that the matrix of the stereo system is applied.

Audio processing

The sound processing in A10E is completely done by the MSP3415D for 'Stereo' sets and the MSP3451G for 'Virtual Dolby' sets:

- Volume control is done by the user via the SOUND menu.
- Tone control in 'Stereo' sets is done via the BASS/TREBLE control.
- Headphone control in 'Stereo'-sets is done via the loudspeaker output of the MSP, no sound control possible. In 'Virtual Dolby'-sets, the MSP has a separate Headphone output so separate sound control is possible.
- Mute control can be done in different ways:
  - System muting: via the SOUND_ENABLE line of the Painter. Used during start-up/switch-off conditions, in order to avoid audible plops.
  - Headphone muting: the presence of a headphone is detected by the FRONT_DETECT line. If present the main speakers will be muted.

Automatic Volume Levelling (AVL)

One of the features of the MSP-family is AVL. If used, it limits the big volume differences in the broadcast between e.g. news transmissions and commercials or within a movie.
To be able to get a Dolby approval (for the Virtual Dolby sets), the AVL feature must be switchable. Therefore, the AVL feature is customer switchable via the menu.

Audio amplification (diagram A6)

The audio output stage is built around IC7702 , which is a balanced amplifier, and is located on the LSP. It uses an monolithic integrated power amplifier IC, the AN5277. The gain of the amplifier is constant. This means that volume control has to be done via the MSP.
The supply voltage is +27 V, generated by the power supply via L5912
The AN5277 delivers an output of 2 x 10 W-RMS to 2 full range speakers. A subwoofer is implemented, for 28" and 32" PW6515 and for 29" FT5515.

Muting

There are 3 types of muting available: system mute, headphone status mute and user mute.

- System muting - System muting is implemented for "special events" such as channel/source change event, loss of identification signal, on/off of set, during search and auto store/program, sound mode change. This muting is transparent to the user. Audio output should be muted before the above "special events" occurred, to prevent problems such as audible plop. Muting is done via the SOUND-ENABLE line connected (via TS7701) to pin 8 of the amplifier-IC and coming from the Painter. This signal is inverted by TS7701, as a result of which at a low level of the SOUND-ENABLE signal the IC will mute.
- Headphone status mute - A headphone status is available to detect the presence of the headphone and mute the main speakers if the headphone is detected. The microprocessor will read the FRONT-DETECT status.
- User muting - This is a mute option available to the user. The user select the MUTE option on the remote control to switched off/on the sound output to the main loudspeaker and the subwoofer.

Headphone amplifier (diagram A6)

The headphone amplifier is built around IC7703 (TDA1308T), which is an integrated class AB stereo headphone driver.

9.1.11 OSD / Teletext / NexTView (diagram C2 & C4)

OSD

The On Screen Display information is generated by the microprocessor IC7064. The RGB and blanking signals for the OSD are fed to the RGB/blanking input of the Video Processing section of IC7301 via the same path as the teletext RGB/ blanking signals.

The control circuit of the BOCMA has a half tone input (pin 13) which is used to reduce the contrast setting during mixed mode operation for teletext and OSD signals. The output signal has an amplitude of about 2 V black-to-white at nominal input signals and nominal settings of the controls. To increase the flexibility of the IC it is possible to insert OSD and/or teletext signals directly at the RGB outputs. This insertion mode is controlled via the Fast Blanking insertion input (pin 38).

Teletext
Sets with the SAA55XX microprocessor have the capability of decoding and displaying both 525-line and 625-line World System Teletext and offer a 10 page Teletext memory.

The teletext function can be divided into the functions described below:
- The Data Capture section takes in the analogue Composite Video and Blanking Signal (CVBS), and from this extracts the required data, which is then decoded and stored in memory.
- The extraction of the data is performed in the digital domain. The first stage is to convert the analogue CVBS
- signal into a digital form. This is done using an ADC sampling at 12 MHz.
- The data slicer extracts the digital teletext data from the incoming CVBS signal. This is performed by sampling the CVBS signal and processing the samples to extract the teletext data and clock.
- The data and clock recovery is then performed by a Multi-rate Video Input Processor (MulVIP). From the recovered data and clock the following data types are extracted: WST Teletext (625/525), Closed Caption, VPS and WSS. The extracted data is stored in on-chip DRAM via the Memory interface.

The capabilities of the display block are based on level 1.5 teletext. It consists of 25 rows each of 40 characters, with the characters displayed being those from rows 0 to 24 of the page memory. The display block supplies the RGB output signals.

For the display timing the signals VFB and HFB from the LSP are used. The display timing arranges the timing of the RGB signal in order to ensure a stable teletext picture:
- The VFB signal (pin 55) is derived from the vertical deflection circuitry. This is a signal with active 'Low' sync pulses.
- The HFB signal (pin 53) is derived from the horizontal output stage. The HFB signal is a signal with active 'HIGH' sync pulses.

Via the pins 46, 47 and 48 of IC7064 the B, G, R colour signals are supplied respectively to the RGB switch of the TDA888X.The output polarity of all these pins is active 'High'. Via pin 52 of IC7064 the FBL (fast blanking) signal is supplied to the RGB switch. Via the fast blanking signal the R, G, B signals are inserted in the television picture.

NextView (EPG)
The EPG in A10 provides the TV viewer with information on the programmes that are being broadcast that day by the first 20 pre-sets. Its functionality is based on the availability of broadcasters transmitting Teletext pages with NexTView data. In regions where no NexTView but still Teletext is broadcasted, the A10 EPG feature provides easy access to common Teletext pages with programme guide.

9.1.12 CRT / SCAVEM / Rotation (diagram B / B / A7)

RGB amplifiers
The integrated RGB video amplifier (IC7830 located on the CRT-panel) has three amplifier channels inside and drives the three cathodes of the colour CRT. The main features of this IC (TDA6107Q) are :
- This amplifier is connected to 200 V only (13 V reference is generated internally).
- Black current stabilisation output is also generated internally and this signal goes directly to the BiMOS feedback input.
- Thermal protection.

The amplifiers are basically 'negative feedback OpAmps' located inside the IC. Pins 1, 2 and 3 are inverting inputs for Green, Red and Blue; pins 7, 8 and 9 are cathode outputs for Blue, Red and Green. Pin 5 is the black current stabilisation output.

Cut-off stabilisation is an auto-tuning loop (active during a four-line period prior to the end of a field blanking pulse) which stabilises the black current of each RGB-channel sequentially and independently. This is a new concept known as 'Continuous Cathode Calibration', provided by the BiMOS. In this concept the cathode drive is adjusted at two points and hence provides better accuracy of black level.

To protect the RGB-amplifier against picture tube flashover discharge, an external protection circuit consisting of D6831, D6833 and D6835 combined with 100 Ohm resistors R3831, R3833 and R3835 is implemented. These diodes clamp the cathode output voltage to VDD. To limit the diode current, external resistors R3832, R3834 and R3836 of 1 kOhm are connected in series with the cathode input of each gun, in conjunction with the 2 kV sparkgaps in the CRT socket.

SCAVEM
The SCAVEM-circuitry is implemented in the layout of the picture tube panel. It is thus not an extra module. SCAVEM means SCAn VElocity Modulation. This means that the horizontal deflection is influenced by the picture content. In an ideal square wave, the sides are limited in slope by a limited bandwidth (5 MHz).
SCAVEM will improve the slope as follows: At a positive slope, a SCAVEM-current is generated which supports the deflection current. The first half of the slope the spot is accelerated and the picture is darker, while at the second half of the slope, the spot is delayed and the slope becomes steeper.
At the end of the slope, the SCAVEM-current decays to zero and the spot is at the original position. An overshoot occurs which improves the impression of sharpness. At the negative slope, the SCAVEM-current counteracts the deflection.
During the first half of the slope, the spot is delayed, the slope becomes steeper.
During the second half the spot accelerates, the SCAVEM-current is zero at the end of the slope.

Via connector 0238, signal 'Y_MAIN_IN' is added to the emitter of TS7864. Via the emitter follower formed with TS7860, this signal is conveyed to the differentiator C2878 and R3864. Only the high frequencies are differentiated (small RC-time). The positive and negative pulses of this signal drive respectively TS7861 and TS7865 into conductivity. The DC setting of the output stage is set by R3870, R3871, R3872 and R3873. The working voltage of the transistors is settled at half the supply voltage.
At the positive section of the pulse, the current flows through R3887 and C2869, the SCAVEM-coil and TS7863. At the negative section of the pulse, the current flows through R3886 and C2869, the SCAVEM-coil and TS7862.

Rotation
In sets with a rotation coil (widescreen sets ≥ 32"), the amount of frame rotation is adjusted with the TILT-output of the Painter (pin 1).

9.2 Abbreviation list

2CS	2 Carrier Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the featurebox
AM	Amplitude Modulation
AR	Aspect Ratio: 4 by 3 or 16 by 9
Artistic	see Painter 2.5: main processor
AVL	Automatic Volume Level
BG	System B and G
BLKIN	Black current information
B-SC1-IN	Blue SCART1 in
B-SC2-IN	Blue SCART2 in
B-TXT	Blue teletext
BOCMA	Bimos one Chip Mid-end Architecture
C-FRONT	Chrominance front input
CL	Constant Level: audio output to connect with an external amplifier
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronisation
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)
CVBS-INT	CVBS signal from Tuner
CVBS-MON	CVBS monitor signal
CVBS-TER-OUT	CVBS terrestrial out
DFU	Direction For Use: description for the end user
DNR	Digital Noise Reduction: noise reduction feature of the box
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
DYN-PHASE-CORR	Dynamic phase correction
EHT	Extra High Tension
EHT-INFO	Extra High Tension information
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTView)
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or via cinches
FBL	Fast Blanking: DC signal accompanying RGB signals
FBL-SC1-IN	Fast blanking signal for SCART1 in
FBL-SC2-IN	Fast blanking signal for SCART2 in
FBL-TXT	Fast Blanking Teletext
FIL	Filament supply voltage
FM	Field Memory or Frequency Modulation
FRONT-C	Front input chrominance (SVHS)
FRONT-DETECT	Front input detection
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)
G-SC1-IN	Green SCART1 in
G-SC2-IN	Green SCART2 in
G-TXT	Green teletext
HA	Horizontal Acquisition: horizontal sync pulse coming out of the BOCMA
HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection
BOCMA	High-end video Input Processor: video and chroma decoder of A10E
HP	Headphone
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.
IO-BUS	In/Out - Bus
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes
LED	Light Emitting Diode
LINE-DRIVE	Line drive signal
LSP	Large signal panel
MSP	Multistandard Sound Processor: ITT sound decoder of A10E
MUTE	Mute-Line
NC	Not Connected
NICAM	Near Instantaneously Companded Audio Multiplexing
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
O/C	Open Circuit
ON/OFF LED	On/Off control signal for the LED
OSD	On Screen Display
Painter	On Screen Display, Teletext and Control; also named Artistic (SAA5565)
P50	Project 50 communication: protocol between TV and peripherals
PCB	Printed Circuit board
PTP	Picture Tube Panel
RAM	Random Access Memory
RC	Remote Control
RC5	RC5 signal from the remote control receiver
RESET	Reset signal
ROM	Read Only Memory
SAM	Service Alignment Mode
SC	Sandcastle: pulse derived from sync signals
SCAVEM	Scan Velocity Modulation
S/C	Short Circuit
SC1-OUT	SCART output of the MSP audio IC
SC2-B-IN	SCART2 Blue in
SC2-C-IN	SCART2 chrominance in
SC2-OUT	SCART output of the MSP audio IC
SIF	Sound Intermediate Frequency
SIMM	80-fold connector between LSP and SSB
SNDL-SC1-IN	Sound left SCART1 in
SNDL-SC1-OUT	Sound left SCART1 out
SNDL-SC2-IN	Sound left SCART2 in
SNDL-SC2-OUT	Sound left SCART2 out
SNDR-SC1-IN	Sound right SCART1 in
SNDR-SC1-OUT	Sound right SCART1 out
SNDR-SC2-IN	Sound right SCART2 out
SNDR-SC2-OUT	Sound right SCART2 out
SNDS-VL-OUT	Surround sound left variable level out
SNDS-VR-OUT	Surround sound right variable level out
SNERT	Synchronous No parity Eight bit Reception and Transmit
SSB	Small Signal Board
STBY	Standby

Circuit descriptions and abbreviation list

SW	Subwoofer
TXT	Teletext
µP	microprocessor
V-BAT	main supply for deflection (mostly 141 V)
VFB	Vertical Flyback Pulse: vertical sync pulse coming from the feature box
VL	Variable Level out: processed audio output towards external amplifier
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal

10. Spare parts list

LSP [A]

Various

	3122 785 90160	Power supply kit A10E
	3122 785 90170	Line deflection kit A10E
0127▲	3122 358 72141	FUSE HOLDER
0132▲	4822 276 14024	Mains switch
0139	4822 492 70788	IC fixation
0141	4822 492 70788	IC fixation
0188	3122 224 04242	HEATSINK BRACKET
0189	3139 124 33361	SSB BRACKET
0211▲	4822 267 10774	Conn 2P
0212▲	4822 265 20723	Conn 3P
0212▲	4822 267 10775	Conn 2P
0214	4822 267 10734	Conn 5P
0215	4822 267 10735	Conn 3P
0226	2422 025 16599	Conn SIMM 80P
0229	4822 267 10748	Conn 3P
0232	4822 267 10565	Conn 4P
0234	4822 267 10735	Conn 3P
0240	2422 025 12485	Conn 11P
0246	4822 267 10565	Conn 4P
0247	4822 267 10734	Conn 5P
0253	4822 267 10735	Conn 5P
0254	4822 267 10735	Conn 3P
1009	9322 127 54667	RC5 rec. TSOP1836UH1
1225	4822 210 10848	Tuner UV1316/A
1225▲	4822 210 10853	Tuner TEDE9-004A
1260	2422 025 16745	Conn 42P
1269	4822 267 10982	Conn 2P
1900▲	2422 086 10905	FUSE 4A
1931	4822 280 10367	Conn 1P
1941▲	4822 071 51602	Fuse 1.6A
1961▲	4822 071 51602	Fuse 1.6A

⊣⊢

2009	4822 124 40207	100µF 20% 25V
2020	4822 122 33177	10nF 20% 50V
2021	4822 122 33172	390pF 5% 50V
2023	4822 126 14043	1µF 20% 16V
2024	4822 126 14043	1µF 20% 16V
2201	5322 122 31863	330pF 5% 63V
2202	4822 126 13692	47pF 1% 63V
2203	5322 122 31863	330pF 5% 63V
2206	5322 122 31863	330pF 5% 63V
2208	5322 122 31863	330pF 5% 63V
2211	5322 122 32658	22pF 5% 50V
2214	5322 122 31863	330pF 5% 63V
2215	5322 122 31863	330pF 5% 63V
2217	5322 122 32658	22pF 5% 50V
2218	5322 122 32658	22pF 5% 50V
2222	5322 122 32658	22pF 5% 50V
2225	5322 122 32658	22pF 5% 50V
2227	4822 122 33575	220pF 5% 63V
2231	5322 122 31863	330pF 5% 63V
2233	5322 122 31863	330pF 5% 63V
2236	5322 122 31863	330pF 5% 63V
2238	5322 122 31863	330pF 5% 63V
2242	5322 122 31863	330pF 5% 63V
2244	5322 122 31863	330pF 5% 63V
2246	4822 124 81286	47µF 20% 16V
2247	5322 122 32658	22pF 5% 50V
2249	4822 122 33575	220pF 5% 63V
2251	5322 122 31863	330pF 5% 63V
2253	5322 122 31863	330pF 5% 63V
2261	4822 124 40196	220µF 20% 16V
2262	5322 122 31647	1nF 10% 63V
2265	4822 124 41643	100µF 20% 16V
2265	4822 124 81044	470µF 20% 6.3V
2266	2238 580 15645	47nF 10% 50V
2271	4822 124 21913	1µF 20% 63V
2276	5322 126 10511	1nF 5% 50V
2280	5322 122 32531	100pF 5% 50V
2281	4822 126 13486	15pF 2% 63V
2282	2238 580 15645	47nF 10% 50V
2284	4822 124 40207	100µF 20% 25V
2404▲	4822 122 31177	470pF 10% 500V
2406	4822 121 43526	47nF 5% 250V
2409	5322 121 42386	100nF 5% 63V
2411▲	2020 558 90491	1n8 10% 2KV
2411▲	4822 126 13435	1.2nF 10% 2KV
2411▲	4822 126 13862	1.5nF 10% 2KV
2411▲	4822 126 14053	1nF 10% 2KV
2414▲	4822 121 70618	12nF 5% 1600V
2416▲	2020 558 90491	1n8 10% 2KV
2416▲	4822 126 11503	820pF 10% 2KV
2416▲	4822 126 13435	1.2nF 10% 2KV
2416▲	4822 126 13451	2.2nF 10% 2KV
2416▲	4822 126 13862	1.5nF 10% 2KV
2416▲	4822 126 14053	1nF 10% 2KV
2417▲	4822 122 31177	470pF 10% 500V
2419	2222 479 90022	0.43µF 250V
2419	2222 479 90029	820nF 5% 250V
2419	4822 121 43888	360nF 5% 250V
2419	4822 126 14096	560nF 5% 250V
2419	4822 126 14097	680nF 5% 250V
2420	4822 124 12265	4.7µF 20% 250V
2420	4822 124 41741	2.2µF 20% 350V
2422	4822 126 13751	47nF 10% 63V
2430	4822 121 41857	10nF 5% 250V
2430	4822 121 51305	15nF 10% 50V
2430	4822 121 70676	27P 10% 50V
2434	2020 021 91543	47µF 20% 160V
2437	4822 121 10619	220nF 10% 250V
2437	4822 121 40472	150nF 10% 250V
2437	4822 121 40518	100nF 10% 250V
2439	4822 121 51252	470nF 5% 63V
2442	4822 126 13838	100nF 50V 20%
2445	2020 012 93596	22µF 20% 250V
2447	4822 124 80791	470µF 20% 16V
2449	4822 124 11767	470µF 20% 25V
2449	4822 124 80791	470µF 20% 16V
2450	4822 124 80791	470µF 20% 16V
2461	5322 121 42386	100nF 5% 63V
2463	5322 121 42386	100nF 5% 63V
2468	5322 121 40323	100nF 10% 100V
2471	4822 121 42035	4.7µF 10% 100V
2473▲	4822 122 31177	470pF 10% 500V
2474	2222 347 90232	27nF 10% 400V
2474▲	4822 121 70545	7.5nF 5% 1.6KV
2474▲	4822 121 70649	9.1nF 5% 1.6KV
2475	4822 121 43526	47nF 5% 250V
2477	2222 479 90022	0.43µF 250V
2477	4822 121 10781	470nF 5% 250V
2478	5322 121 10472	47µF /25
2479	4822 124 81043	10µF 20% 100V
2484	4822 121 43526	47nF 5% 250V
2485▲	4822 126 10206	2.2nF 10% 500V
2487▲	4822 121 70545	7.5nF 5% 1.6KV
2487▲	4822 121 70649	9.1nF 5% 1.6KV
2488	5322 126 10511	1nF 5% 50V
2501	5322 122 32268	470pF 10% 50V
2503	5322 122 32268	470pF 10% 50V
2505	5322 121 42386	100nF 5% 63V
2506	4822 124 40255	100µF 20% 63V
2521	4822 121 42408	220nF 5% 63V
2522	4822 124 40207	100µF 20% 25V
2523	5322 121 42386	100nF 5% 63V
2524	5322 121 42386	100nF 5% 63V
2531	4822 124 40784	3300µF 20% 16V
2532	4822 124 81286	47µF 20% 16V
2701	4822 124 22652	2.2µF 20% 50V
2702	4822 124 40255	100µF 20% 63V
2703	4822 124 22652	2.2µF 20% 50V
2704	4822 124 12056	1000µF 20% 35V
2705	4822 124 21913	1µF 20% 63V
2706	4822 126 13838	100nF 20% 50V
2707	4822 123 14026	470µF 20% 35V
2708	4822 124 21913	1µF 20% 63V
2709	4822 124 12056	1000µF 20% 35V
2711	4822 126 13482	470nF 20% 16V
2712	4822 124 40255	100µF 20% 63V
2713	4822 126 13838	100nF 20% 50V
2714	5322 122 32531	100pF 5% 50V
2714	5322 126 10511	1nF 5% 50V
2715	4822 124 40255	100µF 20% 63V
2716	4822 126 13482	470nF 20% 16V
2717	5322 122 32531	100pF 5% 50V
2717	5322 126 10511	1nF 5% 50V
2718	4822 124 40255	100µF 20% 63V
2719	5322 122 31647	1nF 10% 63V
2720	5322 122 31647	1nF 10% 63V
2722	4822 122 33127	2.2nF 10% 63V
2723	4822 122 33127	2.2nF 10% 63V
2726	4822 124 40255	100µF 20% 63V
2727	5322 122 32654	22nF 10% 63V
2728	5322 122 32654	22nF 10% 63V
2729	5322 122 32654	22nF 10% 63V
2730	5322 122 32654	22nF 10% 63V
2731	4822 126 14043	1µF 20% 16V
2732	4822 126 14043	1µF 20% 16V
2733	4822 124 11947	10µF 20% 16V
2902	4822 126 13589	470nF 275V
2905	4822 121 70141	33nF 5% 400V
2908	4822 126 14153	2.2nF 10% 1KV
2909	4822 126 14153	2.2nF 10% 1KV
2915	4822 124 12415	220µF 20% 400V
2919	2020 021 90654	47µF 20% 50V
2919	4822 124 80604	47µF 20% 50V
2921	5322 122 32311	470pF 10% 100V
2922	4822 126 13862	1.5nF 10% 2KV
2925	5322 122 32311	470pF 10% 100V
2927	3198 014 01520	1N5 10% 50V
2929	4822 126 14049	1.5nF 20% 250V
2932	5322 122 32654	22nF 10% 63V
2936	4822 126 13337	220pF 10% 1KV
2938	4822 122 50116	470pF 10% 1KV
2940	2020 021 91543	47µF 20% 160V
2941	4822 122 31175	1nF 10% 500V
2942	4822 121 42408	220nF 5% 63V
2943	4822 124 40784	3300µF 20% 16V
2944	4822 124 40433	47µF 20% 25V
2945	4822 124 81144	1000µF 16V
2952	4822 126 14585	100nF 10% 50V
2953	4822 126 13751	47nF 10% 63V
2955	4822 122 33336	8.2nF 10% 50V
2961	4822 122 31175	1nF 10% 500V
2962	4822 124 80061	1000µF 20% 25V
2963	4822 126 13561	220nF 10% 16V
2964	4822 122 31175	1nF 10% 500V
2966	4822 124 41584	100µF 20% 10V
2967	4822 124 41584	100µF 20% 10V
2970	5322 122 32331	1nF 10% 100V
2974	4822 124 11583	2200µF 20% 35V
2974	4822 124 12056	1000µF 20% 35V

⊣▭⊢

3007	4822 117 13577	330Ω 1% 0.1W
3008	4822 051 10102	1k 2% 0.25W
3024	4822 051 10102	1k 2% 0.25W
3025	4822 051 20391	390Ω 5% 0.1W
3026	4822 117 11449	2k2 1% 0.1W
3027	4822 051 20391	390Ω 5% 0.1W
3028	4822 051 20562	5k6 5% 0.1W
3029	4822 051 20472	4k7 5% 0.1W
3030	4822 051 20122	1k2 5% 0.1W
3031	4822 116 83933	15k 1% 0.1W
3032	4822 051 20472	4k7 5% 0.1W
3033	4822 116 83933	15k 1% 0.1W
3034	4822 051 10102	1k 2% 0.25W
3035▲	4822 052 10229	22Ω 5% 0.33W
3037	4822 051 20182	1k8 5% 0.1W
3038	4822 051 20182	1k8 5% 0.1W
3201	4822 116 83868	150Ω 5% 0.5W
3202	4822 117 13579	220k 1% 0.1W
3203	4822 116 83868	150Ω 5% 0.5W
3204	4822 117 10834	47k 1% 0.1W
3206	4822 116 83868	150Ω 5% 0.5W
3207	4822 117 13579	220k 1% 0.1W
3208	4822 116 83868	150Ω 5% 0.5W
3209	4822 117 10834	47k 1% 0.1W
3211	4822 116 52201	75Ω 5% 0.5W
3212	4822 116 52175	100Ω 5% 0.5W
3213	4822 116 52264	27k 5% 0.5W
3214	4822 117 11507	6k8 1% 0.1W
3215	4822 116 52175	100Ω 5% 0.5W
3216	4822 116 52201	75Ω 5% 0.5W
3217	4822 116 52175	100Ω 5% 0.5W
3218	4822 116 52201	75Ω 5% 0.5W
3219	4822 116 52175	100Ω 5% 0.5W
3220	4822 117 11149	82k 1% 0.1W
3221	4822 116 52201	75Ω 5% 0.5W
3222	4822 116 52175	100Ω 5% 0.5W
3223	4822 116 52199	68Ω 5% 0.5W
3224	4822 051 10102	1k 2% 0.25W
3226	4822 116 52201	75Ω 5% 0.5W
3227	4822 116 52176	10Ω 5% 0.5W
3231	4822 116 83868	150Ω 5% 0.5W
3232	4822 117 13579	220k 1% 0.1W
3233	4822 116 83868	150Ω 5% 0.5W
3234	4822 117 10834	47k 1% 0.1W

3236	4822 116 83868	150Ω 5% 0.5W
3237	4822 117 13579	220k 1% 0.1W
3238	4822 116 83868	150Ω 5% 0.5W
3239	4822 117 10834	47k 1% 0.1W
3241	4822 116 52264	27k 5% 0.5W
3242	4822 117 11507	6k8 1% 0.1W
3243	4822 116 52201	75Ω 5% 0.5W
3244	4822 116 52175	100Ω 5% 0.5W
3245	4822 116 52199	68Ω 5% 0.5W
3246	4822 051 10102	1k 2% 0.25W
3247▲	5322 117 11726	10Ω 5%
3248	4822 116 52201	75Ω 5% 0.5W
3249	4822 116 52176	10Ω 5% 0.5W
3251	4822 117 13579	220k 1% 0.1W
3252	4822 116 83868	150Ω 5% 0.5W
3253	4822 117 13579	220k 1% 0.1W
3254	4822 116 83868	150Ω 5% 0.5W
3255	4822 051 20479	47Ω 5% 0.1W
3256	4822 051 20479	47Ω 5% 0.1W
3257	4822 051 20479	47Ω 5% 0.1W
3263	4822 051 10102	1k 2% 0.25W
3263	4822 117 11449	2k2 1% 0.1W
3264	4822 117 10833	10k 1% 0.1W
3267	4822 051 20479	47Ω 5% 0.1W
3268	4822 051 20479	47Ω 5% 0.1W
3271	4822 051 20333	33k 5% 0.1W
3272	4822 117 10837	100k 1% 0.1W
3273	4822 051 20223	22k 5% 0.1W
3274	4822 051 20154	150k 5% 0.1W
3276	4822 117 11449	2k2 1% 0.1W
3277	4822 051 20101	100Ω 5% 0.1W
3278	4822 117 11503	220Ω 1% 0.1W
3280	4822 051 20333	33k 5% 0.1W
3281	4822 051 20472	4k7 5% 0.1W
3282	4822 117 10834	47k 1% 0.1W
3401	4822 116 52175	100Ω 5% 0.5W
3402	4822 050 11002	1k 1% 0.4W
3403	4822 116 52269	3k3 5% 0.5W
3403	4822 116 52289	5k6 5% 0.5W
3405	4822 117 12473	4k7 5% 5W
3405	4822 117 12517	5k6 5% 5W
3409	2322 193 53333	33k 5%
3410	4822 116 52191	33Ω 5% 0.5W
3411	4822 053 21334	330k 5% 0.5W
3412	4822 116 52251	18k 5% 0.5W
3414	4822 116 52234	100k 5% 0.5W
3417	4822 116 52228	680Ω 5% 0.5W
3422	3198 012 11030	10k 5% 1W
3430	3198 012 31590	15Ω 5% 3W
3430	4822 053 12339	33Ω 5% 3W
3435	4822 116 52264	27k 5% 0.5W
3435	4822 116 83882	39k 5% 0.5W
3435	4822 116 83884	47k 5% 0.5W
3436	4822 116 52291	56k 5% 0.5W
3436	4822 116 52297	68k 5% 0.5W
3436	4822 116 83882	39k 5% 0.5W
3436	4822 116 83884	47k 5% 0.5W
3437	4822 050 23303	33k 1% 0.6W
3437	4822 116 52257	22k 5% 0.5W
3438	4822 051 20474	470k 5% 0.1W
3439	4822 050 11002	1k 1% 0.4W
3440	4822 117 10837	100k 1% 0.1W
3441	4822 116 83961	6k8 5%
3442	4822 051 20105	1M 5% 0.1W
3442	4822 051 20824	820k 5% 0.1W
3445▲	4822 052 11108	1Ω 5% 0.5W
3446▲	4822 052 11108	1Ω 5% 0.5W
3447▲	4822 052 11108	1Ω 5% 0.5W
3448▲	4822 052 11108	1Ω 5% 0.5W
3449▲	4822 052 11108	1Ω 5% 0.5W
3450	4822 116 52175	100Ω 5% 0.5W
3451	4822 117 10837	100k 1% 0.1W
3456	4822 051 10102	1k 2% 0.25W
3470	4822 050 11002	1k 1% 0.4W
3470	4822 116 52264	27k 5% 0.5W
3471	4822 116 83883	470Ω 5% 0.5W
3472	4822 116 52234	100k 5% 0.5W
3472	4822 116 52304	82k 5% 0.5W
3473	4822 116 52304	82k 5% 0.5W
3474	4822 050 24708	4Ω7 1% 0.6W
3475	4822 050 24708	4Ω7 1% 0.6W
3476	4822 116 52283	4k7 5% 0.5W
3477	4822 116 52238	12k 5% 0.5W
3478	4822 050 21003	10k 1% 0.6W
3479	4822 116 52234	100k 5% 0.5W
3480	4822 050 21003	10k 1% 0.6W
3488	4822 116 52175	100Ω 5% 0.5W
3489	3198 012 26880	6Ω8 PM5% 2W
3490▲	4822 052 10478	4Ω7 5% 0.33W
3491▲	4822 052 10478	4Ω7 5% 0.33W
3492	4822 053 21334	330k 5% 0.5W
3493	4822 050 21003	10k 1% 0.6W
3494	4822 116 52264	27k 5% 0.5W
3501	4822 051 10102	1k 2% 0.25W
3503	4822 051 10102	1k 2% 0.25W
3504	4822 116 52256	2k2 5% 0.5W
3511	4822 116 52283	4k7 5% 0.5W
3512	4822 117 10833	10k 1% 0.1W
3513	4822 117 10833	10k 1% 0.1W
3521▲	4822 052 10158	1Ω5 5% 0.33W
3522	4822 050 21003	10k 1% 0.6W
3523	4822 116 52175	100Ω 5% 0.5W
3524	4822 116 52175	100Ω 5% 0.5W
3525	4822 050 24708	4Ω7 1% 0.6W
3525	4822 116 81154	2Ω2 5% 0.5W
3525	5322 116 53564	3Ω3 5% 0.5W
3526	4822 050 24708	4Ω7 1% 0.6W
3526	5322 116 53564	3Ω3 5% 0.5W
3527	5322 116 53564	3Ω3 5% 0.5W
3528	4822 116 52256	2k2 5% 0.5W
3701	4822 051 20472	4k7 5% 0.1W
3702	4822 051 20472	4k7 5% 0.1W
3703	4822 117 11449	2k2 1% 0.1W
3704	4822 116 52291	56k 5% 0.5W
3705	4822 051 20182	1k8 5% 0.1W
3705	4822 051 20471	470Ω 5% 0.1W
3706	4822 117 10833	10k 1% 0.1W
3707	4822 117 10833	10k 1% 0.1W
3708	4822 117 10837	100k 1% 0.1W
3709	4822 117 11503	220Ω 1% 0.1W
3710	4822 051 20392	3k9 5% 0.1W
3711	4822 051 20392	3k9 5% 0.1W
3712	4822 051 20822	8k2 5% 0.1W
3713	4822 117 11139	1k5 1% 0.1W
3715	4822 051 20332	3k3 5% 0.1W
3716	4822 051 20822	8k2 5% 0.1W
3717	4822 117 11139	1k5 1% 0.1W
3719	4822 117 12955	2k7 1% 0.1W
3720	4822 051 10102	1k 2% 0.25W
3721	4822 117 10837	100k 1% 0.1W
3722	4822 117 12955	2k7 1% 0.1W
3723	4822 051 20332	3k3 5% 0.1W
3724	4822 051 20562	5k6 5% 0.1W
3725	4822 051 20562	5k6 5% 0.1W
3726	4822 051 20109	10Ω 5% 0.1W
3727	4822 116 52176	10Ω 5% 0.5W
3728	4822 051 20109	10Ω 5% 0.1W
3730	4822 051 20273	27k 5% 0.1W
3731	4822 051 20273	27k 5% 0.1W
3732	4822 116 52234	100k 5% 0.5W
3733	4822 051 20561	560Ω 5% 0.1W
3734	4822 051 20478	4Ω7 5% 0.1W
3735	4822 051 20478	4Ω7 5% 0.1W
3736▲	4822 052 10108	1Ω 5% 0.33W
3737▲	4822 052 10108	1Ω 5% 0.33W
3901	4822 053 21475	4M7 5% 0.5W
3902	4822 053 21225	2M2 5% 0.5W
3905	3198 013 04710	470Ω 2% 0.5W
3907	4822 117 12074	7W 1Ω5 10%
3911	4822 116 10075	9Ω 220V
3913	2322 193 53154	150k 5%
3915	4822 053 20335	3M3 5% 0.25W
3917	4822 051 20561	560Ω 5% 0.1W
3923	2120 106 90555	0Ω33 5% 1W
3924	2120 106 90554	0Ω22 5% 1W
3925	4822 116 52228	680Ω 5% 0.5W
3926	4822 116 52269	3k3 5% 0.5W
3928	4822 116 52263	2k7 5% 0.5W
3929	5322 116 53564	3Ω3 5% 0.5W
3931	4822 117 10833	10k 1% 0.1W
3932	4822 117 10833	10k 1% 0.1W
3942	4822 051 20122	1k2 5% 0.1W
3943	4822 116 83881	390Ω 5% 0.5W
3944	4822 116 52257	22k 5% 0.5W
3946	4822 051 20223	22k 5% 0.1W
3947	4822 051 10102	1k 2% 0.25W
3948	4822 051 20683	68k 5% 0.1W
3951	4822 051 20562	5k6 5% 0.1W
3952	4822 117 11149	82k 1% 0.1W
3953	4822 117 10833	10k 1% 0.1W
3954	4822 051 20562	5k6 5% 0.1W
3955	4822 117 10833	10k 1% 0.1W
3957	4822 051 20182	1k8 5% 0.1W
3958	4822 051 10102	1k 2% 0.25W
3962	4822 051 20562	5k6 5% 0.1W
3963	4822 051 20109	10Ω 5% 0.1W
3965	4822 051 20229	22Ω 5% 0.1W
3966	4822 117 10361	680Ω 1% 0.1W
3967	4822 116 52219	330Ω 5% 0.5W
3968	4822 117 12955	2k7 1% 0.1W
3969	4822 050 21003	10k 1% 0.6W
3970	3198 012 32290	22Ω 5%
3977	4822 117 12955	2k7 1% 0.1W
3986	4822 051 20333	33k 5% 0.1W
3987	4822 117 10833	10k 1% 0.1W
3989	4822 051 20334	330k 5% 0.1W
3996▲	4822 053 21155	1M5 5% 0.5W
4xxx	4822 051 10008	0Ω 5% 0.25W
4xxx	4822 051 20008	0Ω 5% 0.25W

〰

5001	4822 157 11828	22U 20%
5002	4822 157 11828	22U 20%
5012	4822 157 11771	0.09µH 10%
5201	4822 157 11235	22U
5202	4822 157 11235	22U
5261	4822 157 11778	5U6 10%
5262	4822 157 50943	12µH
5406	3128 138 33811	LINE DRIVE TRAFO
5406	4822 146 11045	Line DRIVER TRAFO 21"
5411	4822 157 11411	Bead 100MHz
5417	3128 138 53181	LIN. DRUM COIL
5417	3128 138 53191	LIN. DRUM COIL
5417	3128 138 53201	LIN. DRUM COIL
5417	3128 138 53221	LIN.DRUM COIL
5430	4822 157 10359	33U
5430	4822 157 11441	22U 5%
5431▲	2422 531 02417	LOT 1372.48A
5431▲	2422 531 98025	LOT SLOT 1362.04A
5431▲	2422 531 98026	LOT SLOT 1362.03B
5431▲	3128 138 21001	LOT TYPE1
5445	4822 157 50964	100µH
5445	4822 157 52392	27µH
5446	4822 157 11672	12µH 5%
5448	4822 157 11672	12µH 5%
5474	3128 138 31012	Coil
5475	3128 138 37021	FXC COIL - CU15
5478	2422 531 02419	COIL BRIDGE
5521	4822 157 11771	0.09µH 10%
5523	4822 157 11771	0.09µH 10%
5524	4822 157 11771	0.09µH 10%
5902	4822 157 11523	LINE 5mH
5903	4822 157 10999	DMF-2830H
5912	2422 531 02375	Transformer SMT
5920	4822 526 10704	Bead 100MHz
5924	4822 526 10704	Bead 100MHz
5936	4822 526 10704	Bead 100MHz
5939	4822 157 71401	27µH
5941	4822 526 10704	Bead 100MHz
5961	4822 526 10704	Bead 100MHz
5971	4822 526 10704	Bead 100MHz

⊳|

6010	4822 130 83757	BAS216
6012	4822 130 31983	BAT85
6013	4822 130 31983	BAT85
6264	4822 130 83757	BAS216
6265	4822 130 83757	BAS216
6266	4822 130 11397	BAS316
6271	4822 130 11397	BAS316
6273	4822 130 11397	BAS316
6274	4822 130 11397	BAS316
6275	4822 130 11397	BAS316
6276	4822 130 11397	BAS316
6278	4822 130 11397	BAS316
6279	4822 130 10185	UDZS5.6B
6280	4822 130 10852	BZX284-C6V8
6280	9322 107 42685	UDZ12B
6281	4822 130 10852	BZX284-C6V8
6281	9322 107 42685	UDZ12B
6282	4822 130 10852	BZX284-C6V8
6282	9322 107 42685	UDZ12B
6283	4822 130 10852	BZX284-C6V8
6283	9322 107 42685	UDZ12B
6284	4822 130 10852	BZX284-C6V8
6284	9322 107 42685	UDZ12B
6285	4822 130 10852	BZX284-C6V8
6285	9322 107 42685	UDZ12B
6286	4822 130 10852	BZX284-C6V8
6286	9322 107 42685	UDZ12B
6287	4822 130 10852	BZX284-C6V8
6287	9322 107 42685	UDZ12B
6288	4822 130 10852	BZX284-C6V8
6288	9322 107 42685	UDZ12B
6289	4822 130 10852	BZX284-C6V8
6289	9322 107 42685	UDZ12B
6413	4822 130 30621	1N4148
6414	4822 130 83825	BY328/20
6414	9340 559 50112	BY228/24
6419	4822 130 31607	RGP10D

6419	4822 130 42488	BYD33D
6420	4822 130 31607	RGP10D
6420	4822 130 42488	BYD33D
6439	4822 130 34379	BZX79-B27
6440	4822 130 30621	1N4148
6442	4822 130 30621	1N4148
6445	4822 130 31393	BYT52J
6445	4822 130 42606	BYD33J
6447	4822 130 41602	BYW95C
6448	4822 130 41602	BYW95C
6467	4822 130 11148	UDZ4.7B
6468	9322 107 41685	UDZ10B
6472	4822 130 61219	BZX79-B10
6474	9340 559 53112	BYW95C-24
6475	9340 559 53112	BYW95C-24
6480	4822 130 30621	1N4148
6481	3198 010 53390	BZX79-B33
6482	4822 130 31393	BYT52J
6482	4822 130 42606	BYD33J
6483	4822 130 31393	BYT52J
6483	4822 130 42606	BYD33J
6484	4822 130 31393	BYT52J
6484	4822 130 42606	BYD33J
6485	4822 130 20299	P0102DA
6486	4822 130 34379	BZX79-B27
6487	4822 130 34142	BZX79-B33
6505	4822 130 31607	RGP10D
6505	4822 130 42488	BYD33D
6511	4822 130 30621	1N4148
6512	4822 130 34173	BZX79-B5V6
6522	4822 130 31607	RGP10D
6522	4822 130 42488	BYD33D
6701	4822 130 30621	1N4148
6904	4822 130 34142	BZX79-B33
6905	4822 130 34142	BZX79-B33
6911	4822 130 31083	BYW55
6912	4822 130 31083	BYW55
6913	4822 130 31083	BYW55
6914	4822 130 31083	BYW55
6921	4822 130 34142	BZX79-B33
6926	4822 130 31607	RGP10D
6926	4822 130 42488	BYD33D
6928	4822 130 31607	RGP10D
6928	4822 130 42488	BYD33D
6929	4822 130 31607	RGP10D
6929	4822 130 42488	BYD33D
6932	4822 130 30621	1N4148
6938	4822 130 10218	BY229X-800
6941	4822 130 32715	SB340
6942	4822 130 31607	RGP10D
6942	4822 130 42488	BYD33D
6953	4822 130 34382	BZX79-B8V2
6955	4822 130 30621	1N4148
6961	4822 130 32715	SB340
6966	4822 130 31981	BZX79-B3V9
6971	4822 130 10256	EGP20DL-5300
6973	4822 130 30621	1N4148
6986	4822 130 34281	BZX79-B15

7012	4822 130 40959	BC547B
7013	4822 130 44568	BC557B
7014	4822 130 40981	BC337-25
7015	4822 130 40981	BC337-25
7224	4822 130 60511	BC847B
7226	4822 130 60511	BC847B
7273	4822 130 60373	BC856B
7276	4822 130 60511	BC847B
7277	4822 130 60373	BC856B
7280	4822 130 60511	BC847B
7408	4822 130 41646	BF423
7410	9340 547 93127	BU4522AX
7410	9340 550 89127	BU4508AX
7440	4822 130 44568	BC557B
7470	4822 130 11336	STP16NE06FP
7478	4822 130 40959	BC547B
7480	4822 130 40959	BC547B
7481	4822 130 42159	BF819
7482	9340 547 00215	PDTC143ZT
7501	4822 209 61117	TDA8172
7513	4822 130 60511	BC847B
7701	4822 130 60511	BC847B
7702	9322 148 81667	AN5277
7703	4822 209 33165	TDA1308T/N1
7704	4822 130 60511	BC847B
7710	4822 130 60511	BC847B
7711	4822 130 60373	BC856B
7712	4822 130 60373	BC856B
7921	9322 140 38682	STR-F6454
7922	4822 130 60373	BC856B
7929▲	8238 274 02070	TCET1103G
7932	4822 130 60511	BC847B
7942	4822 209 80591	LM317T
7944	4822 130 60511	BC847B
7946	4822 130 60511	BC847B
7948	4822 130 60511	BC847B
7951	4822 130 60511	BC847B
7953	4822 130 60511	BC847B
7955	4822 130 60511	BC847B
7965	4822 130 40855	BC337
7967	9322 137 01682	SI-3050C
7971	4822 209 16707	SE140N
7971	4822 209 17243	SE130N
7987	4822 130 60373	BC856B

CRT [B]

Various

0084▲	2422 500 80052	Conn 9P
0084▲	2422 500 80053	Conn 9P
0084▲	2422 500 80061	Conn 9P
0217	4822 267 10735	Conn 3P

2830	4822 121 51473	470nF 20% 63V
2831	4822 126 13599	3.3nF 10% 500V
2835	4822 126 13838	100nF 20% 50V
2836	4822 121 43897	1nF 5% 400V
2840	4822 124 11565	10µF 20% 250V
2843▲	4822 126 13451	2.2nF 10% 2KV
2860	4822 124 40207	100µF 20% 25V
2866	4822 126 13482	470nF 20% 16V
2869	4822 121 40334	100nF 10% 100V
2870	5322 122 32654	22nF 10% 63V
2871	4822 124 40764	22µF 100 V
2872	4822 122 40112	560pF 10% 500V
2872▲	4822 126 13829	120pF 10% 500V
2873	4822 121 40516	22nF 10% 250V
2876	4822 124 40248	10µF 20% 63V
2877	5322 122 32448	10pF 5% 63V
2878	4822 122 33172	390pF 5% 50V

3831	4822 116 52175	100Ω 5% 0.5W
3832	3198 013 01020	1k 2% 0.5W
3833	4822 116 52175	100Ω 5% 0.5W
3834	3198 013 01020	1k 2% 0.5W
3835	4822 116 52175	100Ω 5% 0.5W
3836	3198 013 01020	1k 2% 0.5W
3837	4822 051 20561	560Ω 5% 0.1W
3837	4822 117 10361	680Ω 1% 0.1W
3838	4822 051 20561	560Ω 5% 0.1W
3838	4822 117 10361	680Ω 1% 0.1W
3839	4822 051 20561	560Ω 5% 0.1W
3839	4822 117 10361	680Ω 1% 0.1W
3840▲	4822 052 10101	100Ω 5% 0.33W
3841▲	4822 052 10108	1Ω 5% 0.33W
3841▲	4822 052 10128	1Ω2 5% 0.33W
3842▲	4822 052 10108	1Ω 5% 0.33W
3842▲	4822 052 10128	1Ω2 5% 0.33W
3843	3198 013 01520	1k5 2% 0.5W
3845	4822 116 52272	330k 5% 0.5W
3860▲	4822 052 10109	10Ω 5% 0.33W
3864	4822 117 11503	220Ω 1% 0.1W
3865	4822 117 10833	10k 1% 0.1W
3866	4822 117 11139	1k5 1% 0.1W
3867	4822 116 52176	10Ω 5% 0.5W
3869	4822 051 20008	jumper (0805)
3870	4822 116 52231	820Ω 5% 0.5W
3871	4822 116 52291	56k 5% 0.5W
3872	4822 117 11148	56k 1% 0.1W
3873	4822 117 11454	820Ω 1% 0.1W
3875	4822 051 20122	1k2 5% 0.1W
3876	4822 051 20008	jumper (0805)
3877	4822 051 20008	jumper (0805)
3878	4822 051 20471	470Ω 5% 0.1W
3879	4822 053 12183	18k 5% 3W
3880	4822 116 52176	10Ω 5% 0.5W
3881	4822 051 20008	jumper (0805)
3882	4822 053 12183	18k 5% 3W
3885	4822 117 11449	2k2 1% 0.1W
3886	2322 194 63338	3Ω3 5%
3887	2322 194 63338	3Ω3 5%
3888	4822 051 20008	jumper (0805)
3892	4822 117 13016	VDR 115V

5842	4822 157 11447	56µH
5842	4822 157 71514	18u 5%
5842	4822 157 71515	68u
5862	4822 157 51216	5.6µH

6831	4822 130 30842	BAV21
6832	4822 130 83757	BAS216
6833	4822 130 30842	BAV21
6835	4822 130 30842	BAV21
6837	4822 130 82969	BZD23-C24
6838	4822 130 82969	BZD23-C24
6863	4822 130 30621	1N4148

7830	9352 561 40112	TDA6108
7830	9352 576 50112	TDA6107Q/N2
7860	4822 130 44154	BF199
7861	4822 130 42589	BF370
7862	4822 130 41617	BD830
7863	4822 130 41616	BD829
7864	4822 130 44568	BC557B
7865	9340 350 20116	BFQ151

SSB [C]

Various

0238	2422 025 12467	Conn 3P
1327	2422 543 01095	X-tal 12MHz
1333	2422 549 44311	cer flt TPWCC16B
1451	2422 549 44372	SAW flt OFWK3953L
1455	2422 549 44369	SAW flt OFWK9656L
1630	2422 543 01059	X-tal 18.432MHz

2010	3198 016 38210	820P 25V
2014	3198 017 41050	1µF 10V
2015	3198 017 41050	1µF 10V
2016	4822 126 14305	100nF 10% 16V
2017	4822 126 14305	100nF 10% 16V
2018	4822 126 14238	2N2 50V
2043	3198 030 74780	4U7 20% 35V
2044	4822 126 14305	100nF 10% 16V
2045	4822 126 14507	18pF 5% 50V
2046	4822 126 14507	18pF 5% 50V
2049	4822 126 13879	220nF 20% 16V
2050	4822 122 31765	100pF 2% 63V
2051	4822 126 14305	100nF 10% 16V
2053	4822 124 23002	10µF 16V
2058	4822 126 14305	100nF 10% 16V
2263	5322 122 32268	470pF 10% 50V
2264	5322 122 32268	470pF 10% 50V
2301	3198 017 41050	1µF 10V
2304	3198 030 74780	4U7 20% 35V
2306	5322 126 11583	10nF 10% 50V
2309	4822 126 14305	100nF 10% 16V
2311	3198 017 41050	1µF 10V
2312	5322 126 11583	10nF 10% 50V
2313	4822 126 14305	100nF 10% 16V
2314	4822 121 70159	0.1µF 16V
2316	4822 126 14494	22nF 10% 25V
2317	4822 126 13879	220nF 20% 16V
2319	4822 126 14305	100nF 10% 16V
2323	3198 017 42230	22nF 50V
2324	4822 126 14305	100nF 10% 16V
2325	3198 017 42230	22nF 50V
2326	3198 017 42230	22nF 50V
2327	4822 126 11671	33pF
2328	4822 126 11671	33pF
2331	3198 030 82280	2U2 20% 50V
2332	4822 126 13879	220nF 20% 16V
2333	4822 126 14305	100nF 10% 16V
2334	4822 126 14494	22nF 10% 25V
2335	3198 017 41050	1µF 10V
2338	4822 126 14238	2N2 50V
2342	4822 122 33752	15pF 5% 50V
2342	4822 122 33777	47pF 5% 63V
2345	4822 122 33752	15pF 5% 50V
2345	4822 122 33777	47pF 5% 63V

2348	4822 122 33752	15pF 5% 50V
2348	4822 122 33777	47pF 5% 63V
2350	5322 124 41945	22µF 20% 35V
2354	3198 017 44740	470nF 10V
2355	3198 017 44740	470nF 10V
2356	3198 017 44740	470nF 10V
2357	4822 122 33741	10pF 10% 50V
2360	5322 126 11583	10nF 10% 50V
2372	4822 126 13193	4.7nF 10% 63V
2373	5322 124 90403	1µF 50V
2374	4822 126 14494	22nF 10% 25V
2375	3198 016 31020	0603 25V 1nF
2376	3198 016 31020	0603 25V 1nF
2377	3198 016 31020	0603 25V 1nF
2380	4822 124 23002	10µF 16V
2401	3198 017 41050	1µF 10V
2402	3198 017 41050	1µF 10V
2403	3198 017 41050	1µF 10V
2404	4822 126 14494	22nF 10% 25V
2405	4822 126 14494	22nF 10% 25V
2407	4822 126 14305	100nF 10% 16V
2408	4822 126 14305	100nF 10% 16V
2412	4822 122 31765	100pF 2% 63V
2415	4822 122 31765	100pF 2% 63V
2417	4822 124 23002	10µF 16V
2420	4822 122 31765	100pF 2% 63V
2421	4822 124 23002	10µF 16V
2422	4822 126 14305	100nF 10% 16V
2423	3198 017 34730	47nF 16V
2424	4822 122 31765	100pF 2% 63V
2425	4822 122 31765	100pF 2% 63V
2426	3198 017 41050	1µF 10V
2428	3198 017 34730	47nF 16V
2433	5322 126 11583	10nF 10% 50V
2434	5322 126 11583	10nF 10% 50V
2441	4822 126 14305	100nF 10% 16V
2442	4822 126 13879	220nF 20% 16V
2443	5322 126 11583	10nF 10% 50V
2444	5322 126 11583	10nF 10% 50V
2445	5322 126 11583	10nF 10% 50V
2446	5322 126 11583	10nF 10% 50V
2447	5322 126 11583	10nF 10% 50V
2449	4822 126 14305	100nF 10% 16V
2450	4822 124 23002	10µF 16V
2451	4822 124 23002	10µF 16V
2452	5322 126 11583	10nF 10% 50V
2453	5322 126 11583	10nF 10% 50V
2460	4822 124 23002	10µF 16V
2464	5322 126 11578	1nF 10% 50V
2601	4822 126 13881	470pF 5% 50V
2602	4822 126 14305	100nF 10% 16V
2606	4822 124 23002	10µF 16V
2607	4822 126 13879	220nF 20% 16V
2610	5322 126 11578	1nF 10% 50V
2611	5322 126 11578	1nF 10% 50V
2612	5322 126 11578	1nF 10% 50V
2613	5322 126 11578	1nF 10% 50V
2614	4822 126 13193	4.7nF 10% 63V
2616	4822 126 13193	4.7nF 10% 63V
2617	3198 017 41050	1µF 10V
2618	3198 017 41050	1µF 10V
2619	4822 126 13193	4.7nF 10% 63V
2620	3198 017 41050	1µF 10V
2621	3198 017 41050	1µF 10V
2622	4822 124 23002	10µF 16V
2623	4822 124 23002	10µF 16V
2624	4822 126 14305	100nF 10% 16V
2625	5322 124 41945	22µF 20% 35V
2626	3198 017 41050	1µF 10V
2627	3198 017 41050	1µF 10V
2628	4822 126 14305	100nF 10% 16V
2629	4822 124 23002	10µF 16V
2631	3198 017 41050	1µF 10V
2632	4822 126 13193	4.7nF 10% 63V
2633	3198 017 41050	1µF 10V
2634	4822 126 13193	4.7nF 10% 63V
2635	3198 017 41050	1µF 10V
2636	4822 126 13193	4.7nF 10% 63V
2637	3198 017 41050	1µF 10V
2638	4822 126 13193	4.7nF 10% 63V
2639	4822 126 13193	4.7nF 10% 63V
2640	3198 017 41050	1µF 10V
2641	4822 126 13193	4.7nF 10% 63V
2642	3198 017 41050	1µF 10V
2643	3198 017 41050	1µF 10V
2646	3198 017 41050	1µF 10V
2651	4822 126 14305	100nF 10% 16V
2652	3198 017 41050	1µF 10V
2653	3198 017 41050	1µF 10V
2655	4822 126 13193	4.7nF 10% 63V
2656	4822 126 13193	4.7nF 10% 63V
2657	4822 124 23002	10µF 16V
2661	4822 126 14305	100nF 10% 16V
2662	4822 124 23002	10µF 16V
2663	4822 122 33777	47pF 5% 63V
2664	4822 126 14225	56pF 5% 50V
2665	4822 126 11669	27pF
2666	4822 126 14508	180pF 5% 50V
2667	4822 122 33752	15pF 5% 50V
2675	3198 016 33380	3P3 50V
2676	3198 016 33380	3P3 50V
2678	3198 017 41050	1µF 10V
2679	4822 126 14305	100nF 10% 16V
2682	3198 017 41050	1µF 10V
2683	3198 017 41050	1µF 10V
2684	3198 017 41050	1µF 10V
2685	3198 017 41050	1µF 10V
2686	3198 017 41050	1µF 10V
2687	3198 017 41050	1µF 10V
2690	3198 017 41050	1µF 10V
2691	3198 017 41050	1µF 10V
2692	3198 017 41050	1µF 10V
2693	3198 017 41050	1µF 10V
2694	3198 017 41050	1µF 10V
2695	3198 017 41050	1µF 10V

3002	4822 117 12902	8k2 1% 0.063W
3003	4822 051 30103	10k 5% 0.062W
3004	4822 117 12902	8k2 1% 0.063W
3007	4822 117 12902	8k2 1% 0.063W
3008	4822 117 12902	8k2 1% 0.063W
3009	4822 117 12902	8k2 1% 0.063W
3010	4822 051 30102	1k 5% 0.062W
3013	4822 117 12902	8k2 1% 0.063W
3014	4822 117 12902	8k2 1% 0.063W
3015	4822 051 30103	10k 5% 0.062W
3017	4822 051 30101	100Ω 5% 0.062W
3018	4822 051 30101	100Ω 5% 0.062W
3019	4822 051 30101	100Ω 5% 0.062W
3021	4822 051 30101	100Ω 5% 0.062W
3022	4822 051 30222	2k2 5% 0.062W
3023	4822 117 12902	8k2 1% 0.063W
3024	4822 051 30102	1k 5% 0.062W
3028	4822 117 12925	47k 1% 0.063W
3029	4822 051 30103	10k 5% 0.062W
3030	4822 051 30102	1k 5% 0.062W
3031	4822 051 30471	470Ω 5% 0.062W
3032	4822 051 30103	10k 5% 0.062W
3033	4822 051 30103	10k 5% 0.062W
3034	4822 117 12925	47k 1% 0.063W
3035	4822 051 30471	470Ω 5% 0.062W
3042	4822 051 30151	150Ω 5% 0.062W
3043	4822 051 30151	150Ω 5% 0.062W
3044	4822 051 30103	10k 5% 0.062W
3045	4822 051 30272	2k7 5% 0.062W
3046	4822 051 30472	4k7 5% 0.062W
3051	4822 117 13525	24k 1% 0.62W
3052	4822 051 30472	4k7 5% 0.062W
3054	4822 051 30103	10k 5% 0.062W
3055	4822 051 30103	10k 5% 0.062W
3056	4822 117 12925	47k 1% 0.063W
3057	4822 051 30103	10k 5% 0.062W
3058	4822 051 30471	470Ω 5% 0.062W
3059	4822 051 30151	150Ω 5% 0.062W
3061	4822 051 30471	470Ω 5% 0.062W
3062	4822 051 30472	4k7 5% 0.062W
3063	4822 051 30102	1k 5% 0.062W
3064	4822 051 30472	4k7 5% 0.062W
3065	4822 051 30472	4k7 5% 0.062W
3066	4822 117 12902	8k2 1% 0.063W
3067	4822 051 30102	1k 5% 0.062W
3081	4822 051 30472	4k7 5% 0.062W
3082	4822 051 30103	10k 5% 0.062W
3083	4822 051 30471	470Ω 5% 0.062W
3084	4822 051 30101	100Ω 5% 0.062W
3085	4822 051 30101	100Ω 5% 0.062W
3086	4822 051 30101	100Ω 5% 0.062W
3088	4822 051 30101	100Ω 5% 0.062W
3090	4822 051 30103	10k 5% 0.062W
3091	4822 051 30103	10k 5% 0.062W
3092	4822 051 30101	100Ω 5% 0.062W
3094	4822 051 30103	10k 5% 0.062W
3302	4822 051 20561	560Ω 5% 0.1W
3303	4822 051 30101	100Ω 5% 0.062W
3306	4822 051 30102	1k 5% 0.062W
3311	4822 051 30273	27k 5% 0.062W
3312	4822 051 30103	10k 5% 0.062W
3315	4822 051 30393	39k 5% 0.062W
3316	4822 051 30101	100Ω 5% 0.062W
3316	4822 051 30681	680Ω 5% 0.062W
3324	4822 051 30391	390Ω 5% 0.062W
3326	4822 051 30102	1k 5% 0.062W
3327	4822 051 20561	560Ω 5% 0.1W
3329	4822 051 30101	100Ω 5% 0.062W
3330	4822 051 30101	100Ω 5% 0.062W
3331▲	4822 117 11748	NFR 2Ω2
3332▲	4822 117 11748	NFR 2Ω2
3333	4822 051 30681	680Ω 5% 0.062W
3334	4822 051 30471	470Ω 5% 0.062W
3335	4822 051 30121	120Ω 5% 0.062W
3339	4822 051 30103	10k 5% 0.062W
3340	4822 051 20561	560Ω 5% 0.1W
3341	4822 051 30151	150Ω 5% 0.062W
3341	4822 051 30479	47Ω 5% 0.062W
3342	3198 021 90030	jumper 0603
3342	4822 051 30008	jumper
3344	4822 051 30151	150Ω 5% 0.062W
3344	4822 051 30479	47Ω 5% 0.062W
3345	3198 021 90030	jumper 0603
3345	4822 051 30008	jumper
3348	4822 051 30151	150Ω 5% 0.062W
3348	4822 051 30479	47Ω 5% 0.062W
3349	3198 021 90030	jumper 0603
3349	4822 051 30008	jumper
3358	4822 051 30101	100Ω 5% 0.062W
3360	4822 051 30101	100Ω 5% 0.062W
3361	4822 051 30101	100Ω 5% 0.062W
3362	4822 051 30101	100Ω 5% 0.062W
3363	4822 051 30101	100Ω 5% 0.062W
3364	4822 051 30102	1k 5% 0.062W
3365	4822 051 20561	560Ω 5% 0.1W
3371	4822 051 30153	15k 5% 0.062W
3372	4822 051 30109	10Ω 5% 0.062W
3373	4822 051 30101	100Ω 5% 0.062W
3374	4822 051 30332	3k3 5% 0.062W
3375	4822 051 30102	1k 5% 0.062W
3376	4822 051 30102	1k 5% 0.062W
3377	4822 051 30101	100Ω 5% 0.062W
3378	4822 051 30102	1k 5% 0.062W
3381	4822 051 30101	100Ω 5% 0.062W
3382	4822 051 30101	100Ω 5% 0.062W
3383	4822 051 30101	100Ω 5% 0.062W
3387	4822 051 30101	100Ω 5% 0.062W
3388	4822 051 30479	47Ω 5% 0.062W
3401	3198 021 90030	jumper 0603
3401	4822 051 30008	jumper
3402	3198 021 90030	jumper 0603
3402	4822 051 30008	jumper
3403	3198 021 90030	jumper 0603
3403	4822 051 30008	jumper
3404	4822 051 30101	100Ω 5% 0.062W
3405	4822 051 30101	100Ω 5% 0.062W
3406	4822 051 30103	10k 5% 0.062W
3407	4822 051 30103	10k 5% 0.062W
3408	4822 051 30103	10k 5% 0.062W
3411	4822 117 12925	47k 1% 0.063W
3412	4822 117 12925	47k 1% 0.063W
3413	4822 051 20561	560Ω 5% 0.1W
3414	4822 117 12925	47k 1% 0.063W
3415	4822 117 12925	47k 1% 0.063W
3416	4822 051 20561	560Ω 5% 0.1W
3417	4822 051 30102	1k 5% 0.062W
3418	4822 051 20561	560Ω 5% 0.1W
3419	4822 051 30101	100Ω 5% 0.062W
3420	4822 051 30101	100Ω 5% 0.062W
3423	4822 051 30102	1k 5% 0.062W
3425	4822 051 30102	1k 5% 0.062W
3426	4822 051 30102	1k 5% 0.062W
3427	4822 051 30101	100Ω 5% 0.062W
3428	4822 051 30101	100Ω 5% 0.062W
3432	3198 021 90030	jumper 0603
3432	4822 051 30008	jumper
3435	4822 051 30223	22k 5% 0.062W
3436	4822 051 30333	33k 5% 0.062W
3439	4822 051 30103	10k 5% 0.062W
3443	3198 021 90030	jumper 0603
3443	4822 051 30008	jumper
3444	4822 117 12891	220k 1%
3453	3198 021 90030	jumper 0603
3453	4822 051 30008	jumper
3455	4822 051 30682	6k8 5% 0.062W
3456	4822 051 30222	2k2 5% 0.062W
3457	4822 051 30273	27k 5% 0.062W
3458	4822 051 30183	18k 5% 0.062W
3461	4822 051 30222	2k2 5% 0.062W
3471	3198 021 90030	jumper 0603
3471	4822 051 30008	jumper
3472	3198 021 90030	jumper 0603
3472	4822 051 30008	jumper
3473	3198 021 90030	jumper 0603

3473	4822 051 30008	jumper
3474	3198 021 90030	jumper 0603
3474	4822 051 30008	jumper
3477	4822 051 30472	4k7 5% 0.062W
3480	4822 051 30102	1k 5% 0.062W
3481	4822 051 30103	10k 5% 0.062W
3482	4822 051 30153	15k 5% 0.062W
3485	4822 051 30479	47Ω 5% 0.062W
3601	4822 051 30101	100Ω 5% 0.062W
3602	4822 051 30101	100Ω 5% 0.062W
3606	4822 051 30273	27k 5% 0.062W
3616	4822 051 30101	100Ω 5% 0.062W
3618	4822 051 30101	100Ω 5% 0.062W
3619	4822 051 30101	100Ω 5% 0.062W
3621	4822 051 30101	100Ω 5% 0.062W
3643	4822 051 30563	56k 5% 0.062W
3644	4822 117 13632	100k 1% 0603 0.62W
3645	4822 051 30102	1k 5% 0.062W
3646	4822 051 30563	56k 5% 0.062W
3647	4822 117 13632	100k 1% 0603 0.62W
3648	4822 051 30102	1k 5% 0.062W
3651	4822 051 30101	100Ω 5% 0.062W
3653	4822 051 30101	100Ω 5% 0.062W
3665	4822 051 30222	2k2 5% 0.062W
3680	4822 051 30109	10Ω 5% 0.062W
3681	4822 051 30109	10Ω 5% 0.062W
4xxx	4822 051 10008	jumper (1206)
4xxx	4822 051 20008	jumper(0805)

5040	3198 018 64780	4U7 5%
5041	3198 018 64780	4U7 5%
5042	3198 018 64780	4U7 5%
5050	4822 157 11778	5U6 10%
5309	4822 157 71334	0.68µH
5332	4822 157 71334	0.68µH
5333	4822 157 71334	0.68µH
5334	3198 018 61080	1U 5%
5334	4822 157 71334	0.68µH
5401	4822 157 71694	0U82 10%
5403	4822 157 71334	0.68µH
5421	4822 157 71334	0.68µH
5425	4822 157 71334	0.68µH
5435	4822 157 71334	0.68µH
5601	3198 018 61080	1U 5%
5602	3198 018 64780	4U7 5%
5625	3198 018 61080	1U 5%
5665	3198 018 61590	15U 5%

6020	4822 130 83649	1SS355
6031	4822 130 11518	UDZ2.4B
6302	4822 130 10837	UDZS8.2B
6303	9322 137 65685	UDZS6.8B
6401	4822 130 11525	1SS356
6412	4822 130 83649	1SS355
6415	4822 130 83649	1SS355
6417	4822 130 83649	1SS355
6605	4822 130 83649	1SS355

7022	3198 010 42310	BC847BW
7053	9340 425 20115	BC847BS
7063	3198 010 42310	BC847BW
7064	9352 640 96557	SAA5565
7064	9352 641 92557	SAA5667
7066	4822 209 17377	M24C32-WMN6
7070	9322 143 59671	UPD431000AGU
7301	9352 626 19557	TDA 8885 QFP-64
7305	3198 010 42310	BC847BW
7307	3198 010 42310	BC847BW
7331	5322 130 42756	BC857C
7368	3198 010 42310	BC847BW
7401	9351 869 40118	74HC4053PW
7402	3198 010 42310	BC847BW
7403	9352 632 26118	TDA9171T/N1
7405	9352 630 99118	TDA9181
7412	9340 425 20115	BC847BS
7413	3198 010 42310	BC847BW
7421	3198 010 42310	BC847BW
7442	3198 010 42310	BC847BW
7443	3198 010 42310	BC847BW
7444	4822 130 60383	BF824
7445	5322 130 42718	BFS20
7630	9351 874 90118	74HC4052PW
7645	9340 425 20115	BC847BS
7650	9351 869 40118	74HC4053PW
7651	9322 143 53671	MSP3415D
7651	9322 149 63671	MSP3451G

SIDE I/O [D]

Various

0240	2422 025 12485	Conn 11P
1254	4822 267 31014	HEADPHONE SOCKET
1255	4822 265 11606	Conn 3P

2286	4822 122 33642	150pF 5% 50V
2288	4822 122 33642	150pF 5% 50V
2292	5322 122 32311	470pF 10% 100V
2294	5322 122 32311	470pF 10% 100V
2296	4822 122 30043	10nF 80% 63V
2297	4822 122 30043	10nF 80% 63V

3285	4822 116 52201	75Ω 5% 0.5W
3286	4822 116 52176	10Ω 5% 0.5W
3287	4822 116 52201	75Ω 5% 0.5W
3288	4822 116 52176	10Ω 5% 0.5W
3289	4822 116 52249	1k8 5% 0.5W
3291	4822 050 11002	1k 1% 0.4W
3292	4822 117 10834	47k 1% 0.1W
3293	4822 050 11002	1k 1% 0.4W
3294	4822 117 10834	47k 1% 0.1W
3295	4822 116 52276	3k9 5% 0.5W
3296	4822 117 10833	10k 1% 0.1W
3297	4822 117 10833	10k 1% 0.1W

6291	9340 548 61115	PDZ12B
6292	9340 548 61115	PDZ12B
6293	9340 548 61115	PDZ12B
6294	9340 548 61115	PDZ12B

TOP-CTRL [E]

Various

0027▲	3139 124 30381	TOP CONTROL BRACKET
0080▲	3139 137 52451	TOP CONTROL ASSY
0080	3139 137 66921	TOP CONTROL BUTTON
0215	4822 267 10748	Conn 3P
1091	4822 276 13775	SWITCH
1092	4822 276 13775	SWITCH
1093	4822 276 13775	SWITCH
1094	4822 276 13775	SWITCH

3091	4822 051 20561	560Ω 5% 0.1W
3092	4822 051 20391	390Ω 5% 0.1W
3093	4822 051 20561	560Ω 5% 0.1W
3094	4822 117 11504	270Ω 1% 0.1W
3095	4822 051 20332	3k3 5% 0.1W
3096	4822 117 11139	1k5 1% 0.1W

6091	4822 130 31983	BAT85

MAINS-_SW [J]

Various

0132▲	4822 276 14024	Mains switch
0214	2422 025 06353	Conn 5P
1002	9322 127 54667	RC5 rec. TSOP1836UH1
1008▲	9322 050 99682	LED LTL-10224WHCR

2001	4822 124 40207	100µF 20% 25V

3003	4822 116 52219	330Ω 5% 0.5W
3004	4822 116 83872	220Ω 5% 0.5W
3008	4822 053 21475	4M7 5% 0.5W
3009	4822 053 21225	2M2 5% 0.5W